SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

REPORTS

ON

CALERA CREEK, QUIMBY CREEK, AND FOWLER CREEK

ZONE E-1

PROJECT NUMBER 40018 (CALERA CREEK)

PROJECT NUMBER 40043 (QUIMBY CREEK)

PROJECT NUMBER 40044 (FOWLER CREEK)

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June 1969

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June 1969

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

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santa clara county

FLOOD CONTROL AND WATER DISTRICT

DONALD K. CURRLIN GENERAL MANAGER

516 EAST MARTHA STREET
SAN JOSE, CALIF. 95112
DEPARTMENT OF ADMINISTRATION AND FINANCE 299-2031
CLERK OF THE BOARD 299-2031
ENGINEERING DEPT. 299-3841
PUBLIC SERVICE DEPT. 299-3841

Board of Directors
Santa Clara County Flood Control
and Water District
516 East Martha Street
San Jose, California 95112

Gentlemen:

Transmitted herewith are the Engineer's reports on Proposed Channel Improvements for Calera Creek, Project No. 40018; Quimby Creek, Project No. 40043; and Fowler Creek, Project No. 40044, all within Zone E-1 (East) of the Santa Clara County Flood Control and Water District.

The Calera Creek report describes 7,900 feet of proposed channels consisting of trapezoidal earth channel, rectangular concrete-lined channel, pipelines, culverts, drop structures, energy dissipators, and debris basins. The estimated cost to the District for these improvements is $786,000.

The Quimby Creek report describes 10,500 feet of proposed channels consisting of trapezoidal earth channel, trapezoidal concrete-lined channel, pipelines, culverts, drop structures, energy dissipators, and a debris basin. The estimated cost to the District for these improvements is $780,000.

The Fowler Creek report describes 12,800 feet of proposed channels consisting of trapezoidal earth channels, pipelines, culverts, drop structures, energy dissipators, and debris basins. The estimated cost to the District for these improvements is $860,000.

The proposed improvements, when constructed, will prevent major flooding of existing and projected developments in the flood plains of Calera, Quimby, and Fowler Creeks.

I concur in the projects as proposed and recommend a public hearing be held as a prerequisite to the construction of the projects.

Sincerely yours,

Donald K Currlin

General Manager

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

REPORT

ON

PROPOSED CHANNEL IMPROVEMENTS

ON

CALERA CREEK

ZONE E-1

PROJECT NUMBER 40018

This report was prepared by
Daniel, Mann, Johnson, & Mendenhall, Engineers-Consultants
and Hans R. Mulberg, Civil Engineer, a Joint Venture

in cooperation with the District's Planning Branch Staff
W. M. Roman - Deputy Director of Engineering
J. L. Richardson - Senior Hydraulic Engineer
W. F. Carlsen - Associate Hydraulic Engineer

June 1969

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INTRODUCTION

Calera Creek, a tributary of Berryessa Creek, originates in the hills northeast of Milpitas at an elevation of approximately 2,400 feet above mean sea level. It flows westerly to its junction with Berryessa Creek just west of the Southern Pacific Railroad track as shown on Plate 2. Presently (1968), about 300 acres of the watershed is within the corporate city limits of Milpitas and the remaining portion is in unincorporated lands of Santa Clara County.

The Calera Creek channel consists of a well-defined arroyo from its headwaters to the vicinity of the Hetch Hetchy right-of-way near Russell Lane at elevation 35. Westerly and below this elevation the channel is considerably shallower and continues to be so to its junction with Berryessa Creek.

Although only a small area within the watershed is presently developed, larger areas are currently in the process of development. According to the City of Milpitas General Plan, adopted January 1964, much of the watershed area is expected to be ultimately developed. Some flooding has occurred in the past in the vicinity of Jacklin Road at North Main Street. Since these lands are and have been in agricultural use, it is not likely that serious damage was caused by this flooding. However, development of this area and nearly all of the valley floor is anticipated within the near future and the damage potential is greatly increased because of the shallowness of the existing channel and its grossly inadequate capacity to carry the design floods. It is therefore proposed to realign and construct a channel of sufficient capacity to safely convey flood waters to the Berryessa Creek channel for ultimate disposal into San Francisco Bay.

WATERSHED DESCRIPTION

GENERAL

The Calera Creek watershed comprises approximately 1,850 acres in northeastern Santa Clara County. The watershed boundary is bordered on the west by the Southern Pacific Railroad, on the north by the watershed of Scott Creek, on the east by the watershed of Calaveras Creek, and on the south and southeast by the watersheds of Tularcitos Creek and Arroyo de los Coches, respectively. Plate 2 delineates the Calera Creek watershed and the contributing areas within it.

PRESENT LAND USE WITHIN THE WATERSHED

Most of the watershed is in steep, hilly, terrain and is currently used for rangeland and grazing. The remaining area, consisting of about 500 acres, is within the gently sloping valley floor and is presently in orchards and grain, with some fallow land. Existing land use within the watershed is as follows:

Industrial-Commercial - A precast concrete products manufacturing plant, a concrete batching plant, and a garden supply sales store are all located on the west side of North Main Street.

Residential - Tract No. 3815 - Walnut Green Acres, and some rural and semi-rural dwellings.

Schools - Eastside Union High School, including the District yard and proposed Thomas Russell Junior High School site.

Agricultural - Three farm reservoirs and a pressure-irrigation system exist within the watershed on the minor tributaries to Calera Creek.

Roads - Existing public roads are: North Main Street, Jacklin Road, Russell Lane, Diel Road, Rancho Higuera Road, and Dempsey Road (the latter to be eliminated upon construction of Sinclair Freeway).

CREEK DESCRIPTION

Calera Creek is approximately four miles in length as measured from topographic maps. From its source, just south of Monument Peak at elevation 2,400 feet near the northern boundary of Santa Clara County, the Creek flows southwesterly approximately 1.3 miles to its junction with a well-defined major tributary at elevation 530 feet. The Creek then continues its flow westerly to elevation 200 feet near the Weller Ranch house and then swings left flowing southwesterly to the westerly-right-of-way line of the proposed Sinclair Freeway. The channel continues in this direction along the southerly property line of the **Milpitas** High School District to the Hetch Hetchy right-of-way near the curve on Russell Lane. The channel slope then flattens considerably and flows westerly to an existing box culvert under North Main Street just north of the Jacklin Road intersection with North Main Street; it then makes a right angle turn and parallels the westerly right-of-way of North Main Street just opposite the aforementioned North Main-Jacklin Road intersection; and finally continues its westerly flow under the Western Pacific Railroad (WPRR) and Southern Pacific Railroad (SPRR) trestles to its terminus at a bend in Berryessa Creek; Berryessa Creek then flows into South San Francisco Bay via Lower Penitencia Creek and Coyote Creek.

EXISTING IMPROVEMENTS AND STORM DRAIN CONNECTIONS

Field inspection of portions of the channel within the proposed improvement limits, indicated on Plate 2 in the Appendix, revealed that attempts have been made by landowners to stabilize the upper reaches of the Creek as evidenced by the existence of four drop structures, the locations of which are indicated on Plate 5. There is a moderate amount of bed and bank erosion of the stream below the next to the lowest structure. Other portions of the channel with steeper slopes are grassed and appear stabilized with well-defined cross-sections. Downstream of the future freeway, the channel cross-section is considerably narrower and shallower. At the Russell Lane bend, the outer creek bed has been sack-riprapped; an appreciable amount of silt, sand, and rock depositions within this bend indicate the decreased carrying capacity of the channel in its natural state. Large quantities of refuse and sediment were observed in the channel west of North Main Street where ponding frequently occurs following heavy rainfalls.

Within the proposed improvement limits, Calera Creek collects local drainage from existing conduits or ditches located along the length of the Creek, as follows:

1. Twin 24-inch corrugated metal pipes under the Rancho Higuera Road.
2. A 30-inch corrugated metal pipe (CMP) drain outfall at the bend in Russell Lane.
3. A 24-inch CMP drain outfall from the Milpitas School District property just below the Jacklin-Russell Lane intersection.
4. An earth ditch on the north side of Jacklin Road near the North Main Street intersection.
5. An earth ditch along the easterly side of North Main Street terminating at the existing North Main Street box culvert.
6. Irrigation reservoir overflow at upstream end of the project.
7. A 21-inch CMP drain outfall from Tract 4270 at Station 52+60.

SOILS INVESTIGATIONS

A soils investigation was conducted in the field (June, 1968) by the firm of Cooper, Clark & Associates, Palo Alto, to assist in the design of channels, to obtain groundwater information, and to determine the nature of the soils within the limits of the proposed improvements. The soils report which is submitted under separate cover is summarized briefly below.

The soils are alluvial and are predominately stiff clays with occasional random zones of silts and gravels.

Free groundwater was encountered at a depth of ten feet in only one boring and seepage was noted in two other borings at a depth of 12 feet ± - all within Reach 1.

In the opinion of the soils engineers, no piling will be required to support the proposed box culverts under the two railroads and under North Main Street.

General areal subsidence within the lower reach may pose a problem in the outfall reaches to San Francisco Bay.

A tractive force analysis based on laboratory soil tests and assuming a 50-year design flood was performed by the soils engineer and District personnel. The findings from these analyses led the District to recommend use of an un-lined earth channel.

ANTICIPATED DEVELOPMENT

Residential - Because of the relatively mild terrain existing within the valley portion of the Calera Creek watershed, it is anticipated that urbanization will occur in this section within the near future. Zoning for residential use has already been granted to land parcels east of North Main Street and Tract 4270, "Walnut Green Acres Unit No. 2", is currently in the construction stage. According to the City of Milpitas General Improvement Plan, as amended January 1967, nearly all the area within the watershed is expected to ultimately develop with projected high land use densities on the valley floor and decreasing densities in the hills. This residential, commercial, and industrial growth will greatly alter the surface characteristics of the watershed and increase the quantity of storm runoff which must be carried by Calera Creek.

Roads - Proposed street and highway improvements within the watershed and those crossing the Calera Creek channel are as follows:

1. Extension of Arizona Avenue and Diel Road by the City of Milpitas.
2. Construction of Escuela Parkway by the City of Milpitas along the Hetch Hetchy right-of-way.
3. Construction of Sinclair Freeway (Route 680) by the State of California within the immediate future.
4. Construction of a proposed frontage road along the northerly right-of-way line of Sinclair Freeway by the City of Milpitas.
5. Widening of North Main Street by Milpitas.

During the course of this study, the foregoing improvements were taken into account and are indicated on Plates 3, 4, and 5.

DESIGN CRITERIA

The criteria used in the design of the Calera Creek flood control improvements followed accepted engineering standards. The hydraulic design of the channel considered the 80% upper confidence limit on design discharge in setting freeboard requirements. Conservative values of roughness (representing the friction along the channel banks and bottom) were used in the hydraulic design to allow for some deterioration in channel smoothness with time. Economic evaluation of alternative channel designs were based on estimates of construction, including engineering and inspection costs, right-of-way values, and the present worth of future maintenance costs.

The level of protection provided by the completed improvements was set by the District standard that the project be designed to safely convey a one percent flood (the so-called 100-year recurrence frequency flood) to a point of disposal. The design flood flows meeting this standard for Calera Creek were computed using runoff coefficients suitable to the characteristic of the watershed considering the potential urbanization and were supplied by the District. The resulting computed design flows are given in Table 1.

TABLE 1

PEAK FLOWS FOR DESIGN FLOODS

REACH	STATION[1]	REACH DESCRIPTION	WATERSHED AREA (ACRES)	PEAK DISCHARGE	
				Design[2]	Upper Limit[3]
7	66 + 85	Sinclair Freeway to end of project	1,510	700	1,250
5, 6	43 + 50	Escuela Parkway R/W to Sinclair Freeway	1,600	720	1,290
1 - 4	0 + 50	Berryessa Creek confluence to Escuela Parkway R/W	1,910	750	1,300

(1) At lower location on Reach.

(2) Design flow in cubic feet per second for 100 year recurrence frequency.

(3) Upper limit flow in cubic feet per second for 100 year recurrence frequency at 80% confidence level.

DESCRIPTION OF PROPOSED PROJECT

GENERAL

The proposed Calera Creek improvements extend for a length of 8,000 feet beginning at the Berryessa Creek confluence and terminating 1,400 feet north of the future Sinclair Freeway. Improvements consist of trapezoidal earth channel, reinforced concrete box culverts and rectangular channels, closed box conduits, reinforced concrete pipe, energy dissipators, transition structures, and an upstream inlet structure. During the course of this study, various alternative channel sections and construction materials were investigated and their respective advantages and disadvantages evaluated. The recommended improvements on Calera Creek are shown on Plates 3, 4, and 5 and discussed in detail below.

DETAILED DESCRIPTION

REACH 1 and 2: FROM BERRYESSA CREEK CONFLUENCE TO 600 FEET EAST OF FUTURE ARIZONA AVENUE (STATION 0 + 00 to 29 + 30).

The proposed improvements in these Reaches consist of a confluence structure, two railroad crossings, an energy dissipator, two street crossings, and an intervening trapezoidal earth channel.

1. Confluence Structure

A confluence structure will be constructed at the intersection of Calera and Berryessa Creeks and will consist of an open top transition structure at the outlet end of the proposed railroad culvert (see Section 2 below). The structure will flare out to reduce culvert velocities and terminate at the bend in Berryessa

Creek. Construction of the confluence structure should be coordinated with the improvements planned for Berryessa Creek.

2. Railroad Crossings

A preliminary field survey was conducted to determine the location and elevation of the existing Southern Pacific Railroad (SPRR) and Western Pacific Railroad (WPRR) trestles spanning Calera Creek. From this survey, it was determined that the Southern Pacific Railroad tracks were three feet lower than the Western Pacific Railroad tracks, and that the existing channel under both trestles is shallow and of insufficient cross sectional area to pass the design flows. Because of the length of the existing railroad crossings, as well as the requirement of the railroad companies for noninterruption of rail traffic, the required channel crossing under the tracks will be expensive. Alternative ways of crossing the railroads were considered and evaluated in light of economic and hydraulic considerations. The following alternatives were considered:

a. Inverted Siphon: While construction of a siphon would be relatively simple, this alternative is undesirable because of operational difficulties resulting from siltation and attendant maintenance problems.

b. Jacking reinforced concrete box culvert: This method of crossing railroad rights-of-way has been utilized by the Los Angeles County Flood Control District; however, there is little experience with this method in the Bay Area and cost data is limited. To simplify construction, jacking would be accomplished south of the existing trestles and would require realignment of the lower portion of the channel.

c. Railroad Bridges: This method would consist of installing standard precast concrete bridges by the Railroads and would result in minimal service interruption. This method would provide a satisfactory crossing but would be more costly than other alternatives.

d. Cast-in-place box culvert: This solution would consist of forming the required twin-barrel box culvert against the existing trestle piles to avoid disruption of railroad traffic. Based on our investigations, this type of crossing appears to be the most feasible solution. The box culvert, as a single structure under both railroads, would operate under slight pressure head at the design flood.

e. Raising existing Southern Pacific tracks: This method would probably be the most expensive alternative. In order to provide sufficient headroom for the box culvert and maintain a free water surface, the Southern Pacific Railroad tracks would have to be raised approximately three feet. The tracks could be raised in conjunction with the track raising considered for the Berryessa Creek improvements. According to Southern Pacific Company personnel, the railroad has no plans for track raising and this type of project will require the construction of a shoofly (temporary bypass for rail traffic) at a cost of approximately $40,000.

It is recommended that additional detailed studies for the joint railroad crossings be conducted prior to final design. For the purpose of this study, however, twin box culverts are recommended as shown on Plate 3.

3. Open Channel

The following alternatives were considered for carrying the design flows within Reaches 1 and 2: (a) Reinforced concrete rectangular channel, (b) closed conduit, (c) trapezoidal concrete-lined channel, and (d) trapezoidal earth channel. The trapezoidal earth channel was found to be the most feasible. The proposed earth channel parallels the existing creek between the Western Pacific Railroad and North Main Street. East of North Main Street the channel alignment differs from the existing creek but conforms to that recommended by the City of Milpitas. From North Main Street it parallels a portion of Jacklin Road, then swings northerly and under future Arizona Avenue. The North Main crossing will require double 10-foot wide by 8-foot high box culverts, and the future Arizona Avenue crossing will require double 8-foot wide by 8-foot high box culverts with both having inlet and outlet transitions to reduce turbulence. It is anticipated that the City of Milpitas will pay for the additional 40 feet of the box culvert under North Main Street required for the proposed widening of this thoroughfare and the entire cost, including inlet and outlet transitions, of the future Arizona Avenue crossing. East of Arizona Avenue the proposed earth channel parallels the present course of Calera Creek along the southerly and easterly boundary of the Eastside Union High School District. A 5-foot wide area on each side of the trapezoidal channel has been shown for landscaping if desired by City or County. Because of a marked increase in slope from subcritical to supercritical for the design flows, it will be necessary to install an energy dissipator at Station 29+30. Preliminary investigations indicate that a U.S. Bureau of Reclamation Type III Stilling Basin with transition sections would be satisfactory.

REACH 3: ENERGY DISSIPATOR TO FUTURE ESCUELA PARKWAY (STATION 29 + 30 TO 39 + 90)

Upstream of the energy dissipator, four types of conduits were considered for this length and are as follows:

1. Reinforced Concrete Pipe
2. Earth Channel with Drop Structures
3. Concrete-lined trapezoidal channel
4. Reinforced concrete rectangular channel.

Alternative 4, a reinforced concrete rectangular channel, was selected. The reinforced concrete pipe and earth channel with drop structures alternatives were found to be more expensive than the selected channel. A lined trapezoidal channel was eliminated because of potential flow instability on supercritical slopes resulting in downstream cross waves. With the selected cross section, a 15-foot maintenance access road is provided on the easterly side; on the westerly side, the toe of the proposed school fill will be at a point one foot below the top of the channel.

REACH 4: FUTURE ESCUELA PARKWAY CROSSING (STATION 39 + 90 TO 43 + 50)

This crossing is another major expense item for the proposed project. The Hetch Hetchy right-of-way is contained within this crossing and consists of a 78-inch and a 96-inch aqueduct (Bay Division Pipelines 3 and 4 respectively) located at a relatively shallow depth. Three alternative solutions of the Hetch Hetchy crossing were investigated:

1. Lowering of both aqueducts
2. A siphon undercrossing
3. A shallow reinforced concrete box culvert overcrossing.

The proposed plans by the City of Milpitas to construct future Escuela Parkway, paralleling and straddling the Hetch Hetchy right-of-way, were considered in arriving at a recommended solution.

After reviewing preliminary plans for each alternative, San Francisco Water Department personnel stated that all three alternatives were acceptable as aqueduct crossings. Comments received from the Department are as follows:

1. Lowering the Aqueducts: The cost of lowering both pipelins was estimated to be between $80,000 and $90,000.
2. Siphon Pipeline Undercrossing: Minimum clearance between the top of the proposed siphon and the lowest aqueduct should be two feet with the same siphon elevation maintained throughout the entire Hetch-Hetchy right-of-way.
3. Culvert Overcrossing: A minimum clearance of six inches between the top of the highest aqueduct and the bottom of the culvert would be required. The Water Department also requires the encasement in concrete of both aqueducts for those lengths below the proposed box culvert, estimated to cost between $15,000 and $20,000.

Alternative (1) consisting of the lowering of the aqueducts is the most expensive and therefore is not recommended. Although the siphon alternative (2) was found to be the cheapest alternative based on initial construction costs, consideration of the maintenance problem, consisting of frequent cleanout of silt, rock, and debris, led to the recommended box culvert overcrossing. The selection of the shallow box culvert depth resulted from the requirements and economic considerations of the future Escuela Parkway grade over the culvert; any additional culvert depth would require additional costly Parkway road bed fills, especially on the east side of the channel. Provision would be made to allow connection into the box culvert of adjacent storm drain outfalls including the 30-inch Russell Lane storm drain and another outfall from the school site. The overcrossing will require an inlet transition and a special outlet dissipator to reduce the supercritical flow energy prior to entering the downstream rectangular channel to minimize flow disturbances.

REACH 5: FUTURE ESCUELA PARKWAY TO FUTURE SINCLAIR FREEWAY (STATION 43 + 50 TO 63 + 40)

For this reach, the recommended 8-foot by 7-foot high reinforced concrete box culvert is comparable in cost to an equivalent concrete pipe. In order to collect local drainage, a two-foot deep swale is required to channel these flows to high capacity inlet structures at the manholes. The swale can also be used as an access roadway. A closed conduit is especially suited for this reach because of possible flow instability due to steep gradients and the desirability of maintaining the present esthetic quality of the area. The underground culvert will also reduce the hazard potential to adjacent Russell Junior High School students and residents of proposed Tract No. 4270, both adjacent to the channel.

REACH 6: FUTURE SINCLAIR FREEWAY CROSSING (STATION 63 + 40 TO 66 + 85)

For this reach, the State Division of Highways proposes to construct a reinforced concrete box culvert with a warped wingwall inlet structure, an outlet baffled energy dissipator and sacked concrete slope protection at each end to conform to the bottom and cross-section of the existing creek. In order to connect the proposed downstream 8-foot by 7-foot box culvert to the lower end of this reach, it will be necessary to remove the slope protection as well as the interim concrete energy dissipator and to construct a transition. At the upper end, it will be necessary to remove the interim slope protection and construct a transition from the box culvert to the proposed pipe for Reach 7.

REACH 7: SINCLAIR FREEWAY TO END OF PROJECT (STATION 66 + 85 TO 79 + 15)

An 84-inch reinforced concrete pipe is recommended for this reach for the reasons cited. The pipeline cost was found to be approximately equal to a rectangular channel and considerably less than an earth channel with the required drop structures. A combination inlet and debris basin equipped with a hooded inlet would be constructed at the existing drop structure. Upstream of the inlet structure, the present channel is relatively stable, well-grassed, and consists of a well-defined arroyo with sufficient capacity for the design flow. Until such time in the future as the gradual urbanization of the entire watershed takes place upstream, no channel improvements other than occasional maintenance and possible construction of additional debris basins will be required.

CONSTRUCTION STAGING

In order to reduce the capital outlay in any single fiscal year and to coordinate activities with adjacent construction, staging of channel improvements is required. Calera Creek consists of a well-defined although inadequately sized channel and it is therefore possible to stage construction and maintain the existing channel for runoff. Future construction by the Eastside Union High School District and the State Division of Highways, and development of a parcel abutting the creek, has resulted in joint commitments by the State, District, City of Milpitas, and the developer. These commitments have been integrated into the recommended staging scheme.

STAGE I consists of the construction of the reinforced concrete rectangular-channel, and the Hetch Hetchy overcrossing through a portion of the Eastside Union High School District, all within Reaches 3 and 4 (Station 29 + 30 to 43 + 50). Temporary low-cost sacked riprap transitions to and from the existing creek must be constructed at each end. It is recommended that the existing channel from the Berryessa Creek confluence, the North Main Street box culvert, and the portion of Reach 5 along the property lines common to Russell Junior High School and Tract No. 4270 should be regularly cleared and maintained to provide interim flood plain protection.

STAGE II consists of the construction of the proposed reinforced concrete box culvert conduit from the Escuela Parkway right-of-way to the future Sinclair Freeway (Station 43 + 50 to 63 + 40) along the property line common to the High School District and Tract 4270, all within Reach 5. It will include the connection to the south end of the Freeway box culvert.

STAGE III consists of the construction of the confluence structure, railroad crossings, North Main Street and Arizona Avenue box culverts, the energy dissipator at Station 29 + 30 and the intervening earth channel and energy dissipator from the beginning of the project to Station 29 + 30, all within Reaches 1 and 2.

STAGE IV consists of the construction of the remaining portion of the project from the north side of Sinclair Freeway to the end of the project, all within Reach 7 (Station 66 + 85 to 79 + 15). It will include the construction of a transition structure at the freeway right-of-way, a transition inlet structure and debris basin at the end of the project, and a connecting pipe conduit with manholes and inlets.

PROJECT COSTS AND FINANCING

Construction cost estimates for the Calera Creek project were based on prices prevailing during the spring of 1968. For each type of conduit the in-place costs were developed from costs of material, labor, and earthwork and were found to be in agreement with bid prices received for like items. In addition to the basic construction costs, engineering and incidental costs (including advertising, legal fees, etc.) in the amount of 25 percent of the basic construction costs were added. The construction and right-of-way costs for the various reaches of the project are presented in Table 2.

Although some of the permanent rights-of-way required may be ultimately dedicated to the District by developers, such costs were included in arriving at the total and are indicated in Table 2. The cost of right-of-way to be obtained from the Southern Pacific and Western Pacific Railroads, City of Milpitas, San Francisco Water Department, and State Division of Highways were excluded in arriving at the total costs.

The project can be financed from zone taxes by staging the construction over several years. If more rapid construction is desired, then diversion of funds from other projects in the East Zone or a bond issue would be needed to accomplish the acceleration of this project.

TABLE 2

PROJECT COSTS AND CONSTRUCTION STAGING

Stage	Reach	Construction Cost	R/W Cost	Total Cost
I	3 & 4	$204,000	$ 6,000	$210,000
II	5	179,000	0 (2)	179,000
III	1 & 2	201,000 (1)	82,000 (3)	283,000
IV	7	103,000	11,000	114,000
Total		$687,000	$ 99,000	$786,000

Note: Construction cost includes an allowance of 25 percent for engineering and contingencies and is rounded to the nearest thousand dollars.

(1) Excludes the cost of the future Arizona Avenue box culvert and 40 feet of North Main Street box culvert amounting to an estimated construction cost of $38,000.

(2) Right-of-way dedication from Eastside Union High School District and Tract No. 4270 at no cost to the District.

(3) Right-of-way cost for the planter areas is not included.

CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are presented as a result of our investigations.

1. The lower reaches of Calera Creek downstream from the future Sinclair Freeway are of inadequate capacity to safely convey the design flood waters and to prevent resulting damage to existing and anticipated urbanized developments.
2. Potential urbanization of the watershed consisting of residential, commercial, and industrial developments will greatly increase the peak runoff from the watershed with possible flood damage to such improvements and resultant hazard and inconvenience to persons.
3. The existing railroad trestles and North Main Street box culvert will cause substantial flow backup at the design flood resulting in potential flooding damage to adjacent lands.
4. The most economical and feasible method of collecting and safely disposing of the Calera Creek watershed will require the construction of:
    - a. A confluence structure at Berryessa Creek.
    - b. A box culvert under the two railroads.
    - c. A trapezoidal open channel and box culvert road crossings to a point approximately 600 feet east of future Arizona Avenue.
    - d. A reinforced concrete rectangular channel adjacent to the High School District property to the Hetch Hetchy right-of-way.

e. A reinforced concrete box culvert overcrossing of the Hetch-Hetchy aqueducts extending to the future Sinclair Freeway right-of-way.

f. A reinforced concrete pipe to the end of the project, approximately 600 feet north of the future Sinclair Freeway.

g. An inlet-transition structure and associated bar rack and silt and bed load trap.

5. The open channel part of the project shows a 5-foot area on each side set aside for landscaping. The cost for right-of-way and for developing and maintaining these planting areas has not been included in the estimated project cost. Based on discussions with other agencies that have this type of development, the cost of maintenance would be $800.00/mile/year or $10,000.00 for the life of the project. A district-wide study will be made in the future to determine the best type of aesthetic treatment and its corresponding cost for our facilities.

The 1400 feet of reinforced concrete rectangular channel can receive aesthetic treatment similar to that recently utilized in the Town of Fremont, Alameda County, for flood control channel construction through the gardens of Mission San Jose. This treatment, which received wide acclaim as significantly improving the appearance of channels, would increase the construction cost for this reach approximately 5 to 7 percent.

6. The project can be financed from zone taxes by staging the construction over several years. If more rapid construction is desired, then the diversion of funds from other projects in the East Zone or a bond issue would be needed to accomplish the acceleration of this project.

Submitted by:

Daniel, Mann, Johnson, & Mendenhall
C T Blair
C. T. Blair, Vice President
San Francisco Division
J S Schupp
J. S. Schupp, Project Manager
San Francisco Division

Hans R. Mulberg, Inc.
Hans R Mulberg
Hans R. Mulberg
President

Recommended Approval:
William Roman
William Roman
Project Coordinator

Approved:
Lloyd C Fowler
Lloyd C. Fowler
Director of Engineering

MAP AND GENERAL PLAN

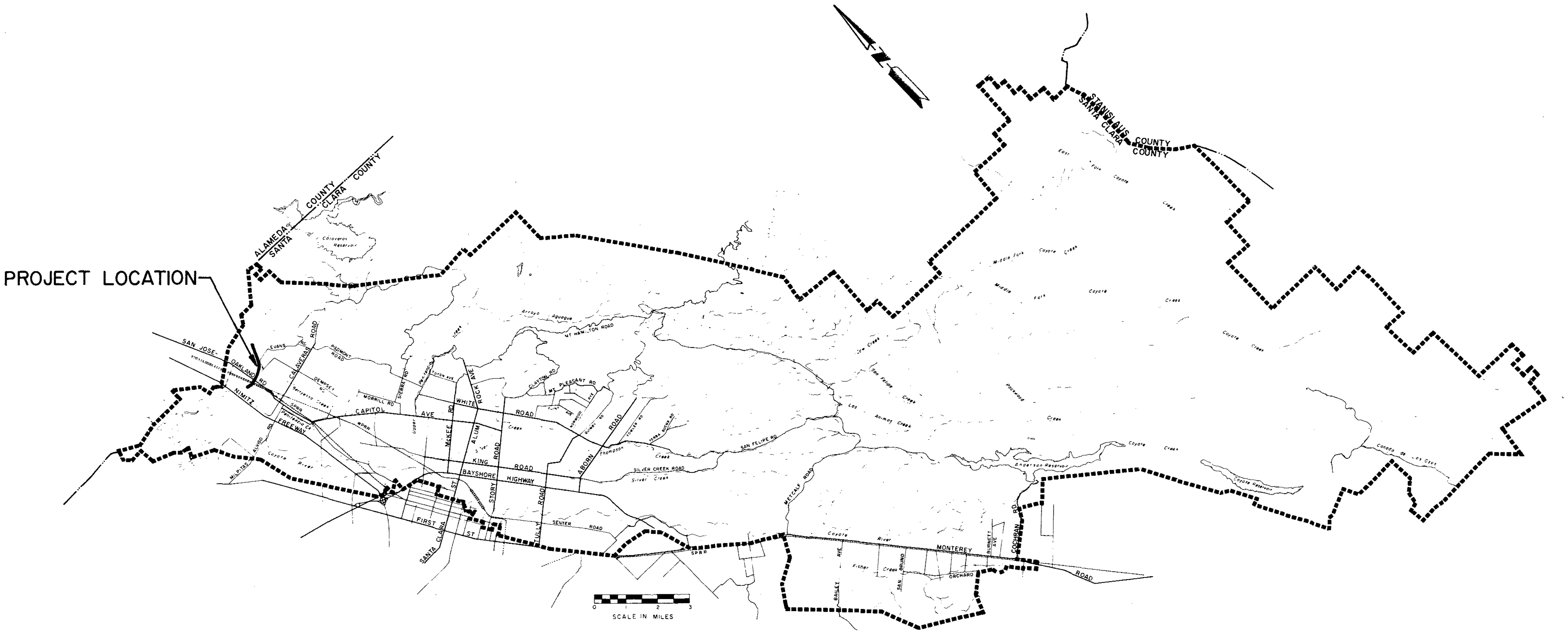
FOR

CALERA CREEK

FROM BERRYESSA CREEK TO FOOTHILLS

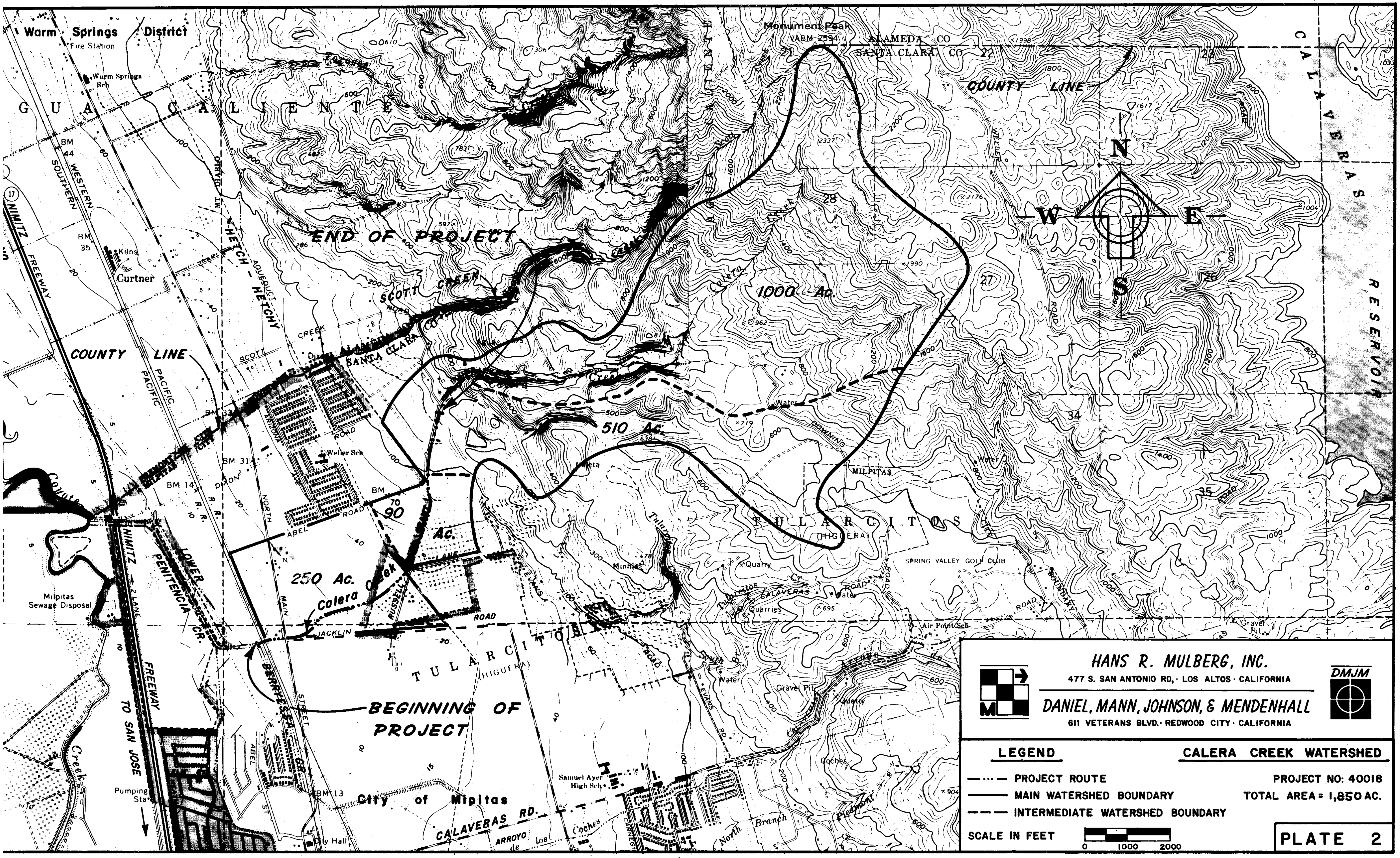
PROJECT NO. 40018 IN ZONE E-1 'EAST'

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT
SANTA CLARA COUNTY, CALIFORNIA



Project Approval: Donald K Currlin
General Manager
Date: 4/30/69

PLATE I



HANS R. MULBERG, INC.
477 S. SAN ANTONIO RD. · LOS ALTOS · CALIFORNIA

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611 VETERANS BLVD. · REDWOOD CITY · CALIFORNIA

DMJM

LEGEND

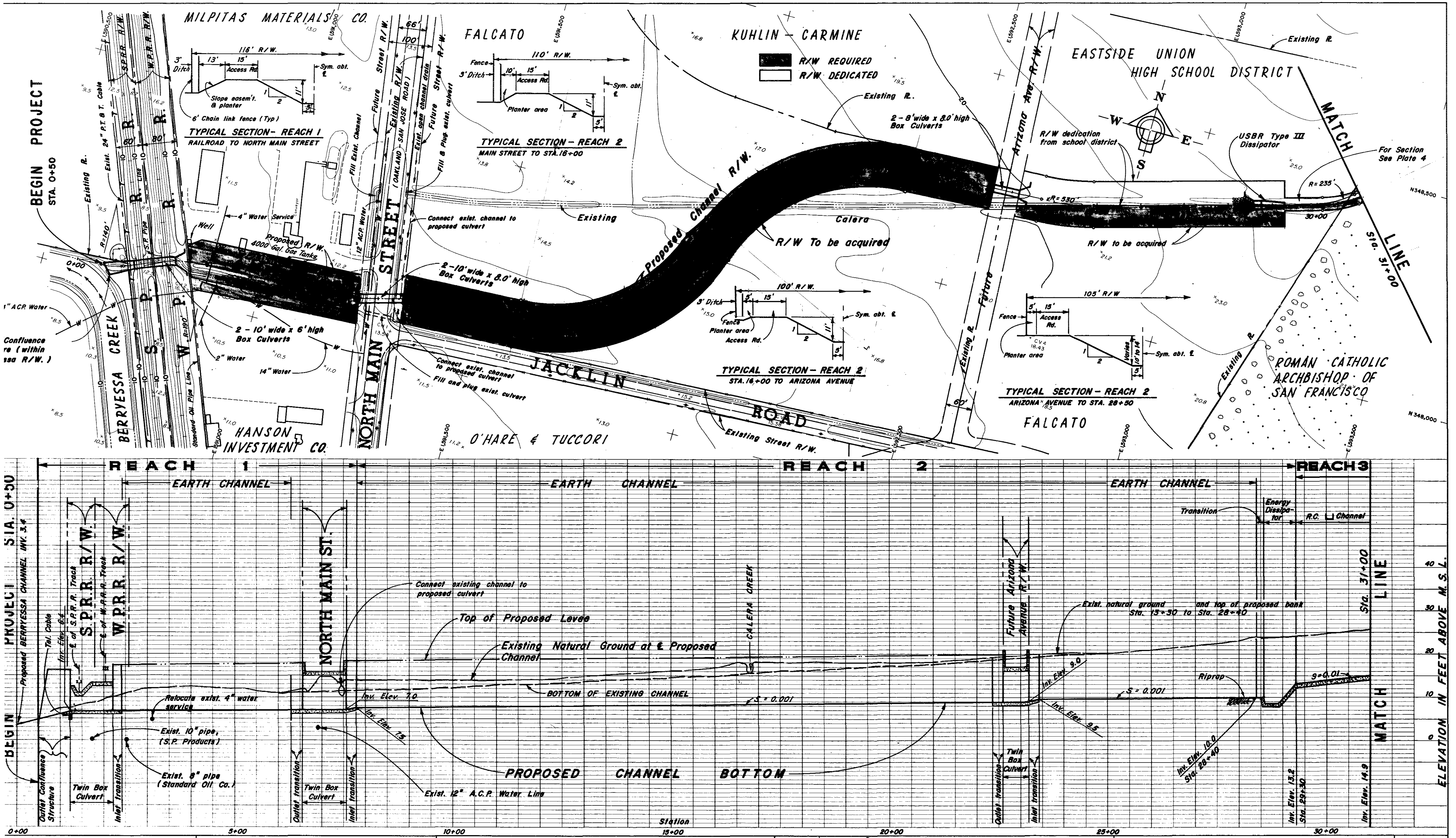
-·-·- PROJECT ROUTE
—— MAIN WATERSHED BOUNDARY
— — INTERMEDIATE WATERSHED BOUNDARY

SCALE IN FEET 0 1000 2000

CALERA CREEK WATERSHED

PROJECT NO: 40018
TOTAL AREA = 1,850 AC.

PLATE 2


MILPITAS MATERIALS CO.
FALCATO
KUHLIN - CARMINE
EASTSIDE UNION HIGH SCHOOL DISTRICT
R/W REQUIRED
R/W DEDICATED
BEGIN PROJECT STA. 0+50
TYPICAL SECTION - REACH 1
RAILROAD TO NORTH MAIN STREET
116' R/W.
3' Ditch
13'
15'
Access Rd.
Sym. abt. ℄
Slope easem't. & planter
6' Chain link fence (Typ)
TYPICAL SECTION - REACH 2
MAIN STREET TO STA. 16+00
110' R/W.
Fence
Planter area
TYPICAL SECTION - REACH 2
STA. 16+00 TO ARIZONA AVENUE
100' R/W.
TYPICAL SECTION - REACH 2
ARIZONA AVENUE TO STA. 28+50
105' R/W
Varies 10' to 14'
Existing ℄
2 - 8' wide x 8.0' high Box Culverts
2 - 10' wide x 8.0' high Box Culverts
2 - 10' wide x 6' high Box Culverts
Proposed Channel R/W.
R/W To be acquired
R/W to be acquired
R/W dedication from school district
USBR Type III Dissipator
For Section See Plate 4
R = 235'
R = 530'
MATCH LINE Sta. 31+00
Calera
Existing
Connect exist. channel to proposed culvert
Fill and plug exist. culvert
Fill Exist. Channel
Exist. open channel drain
Future Street R/W
NORTH MAIN STREET (OAKLAND SAN JOSE ROAD)
Arizona Ave. R/W
Future
Existing Street R/W.
JACKLIN ROAD
S.P.R.R. R/W.
W.P.R.R. R/W.
BERRYESSA CREEK
Confluence
Proposed R/W. 4000 Gal. Gas Tanks
4" Water Service
Well
2" Water
14" Water
12" ACP Water
Standard Oil Pipe Line
HANSON INVESTMENT CO.
O'HARE & TUCCORI
FALCATO
ROMAN CATHOLIC ARCHBISHOP OF SAN FRANCISCO
N W E S
REACH 1
REACH 2
REACH 3
EARTH CHANNEL
BEGIN PROJECT STA. 0+50
Proposed BERRYESSA CHANNEL INV. 3.4
NORTH MAIN ST.
CALERA CREEK
Future Arizona Avenue R/W.
Connect existing channel to proposed culvert
Top of Proposed Levee
Existing Natural Ground at ℄ Proposed Channel
BOTTOM OF EXISTING CHANNEL
S = 0.001
Inv. Elev. 7.0
Inv. Elev. 7.5
Inv. Elev. 9.0
Inv. Elev. 9.5
Inv. Elev. 10.0 Sta. 28+40
Inv. Elev. 13.2 Sta. 29+30
Inv. Elev. 14.9
Relocate exist. 4" water service
Exist. 10" pipe (S.P. Products)
Exist. 8" pipe (Standard Oil Co.)
Exist. 12" A.C.P. Water Line
PROPOSED CHANNEL BOTTOM
Exist. natural ground and top of proposed bank Sta. 13+30 to Sta. 28+40
Riprap
Transition
Energy Dissipator
R.C. ⊔ Channel
Outlet Confluence Structure
Twin Box Culvert
Inlet transition
Outlet transition
Station
0+00
5+00
10+00
15+00
20+00
25+00
30+00
ELEVATION IN FEET ABOVE M.S.L.
0
10
20
30
40
MATCH LINE Sta. 31+00

REFER TO TRACING FOR LATEST REVISION

DESCRIPTION	SUB	APPR

REFERENCE INFORMATION AND NOTES

1. DATE OF PHOTOGRAPHY - APRIL 20, 1967; MISSION 6712

SCALE

100 0 100 200 300

CONTOUR INTERVAL: 2 FEET

HANS R. MULBERG, INC.
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DANIEL, MANN, JOHNSON, & MENDENHALL
611 VETERANS BLVD. · REDWOOD CITY · CALIFORNIA

DMJM

DATE	NOV. 8, 1968
DESIGN	E. J. H.
DRAWN	W. K.
CHECKED	F. H. B.

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY: E.J. Hakanian

ENGINEERING APPROVAL
PROJECT ENGINEER

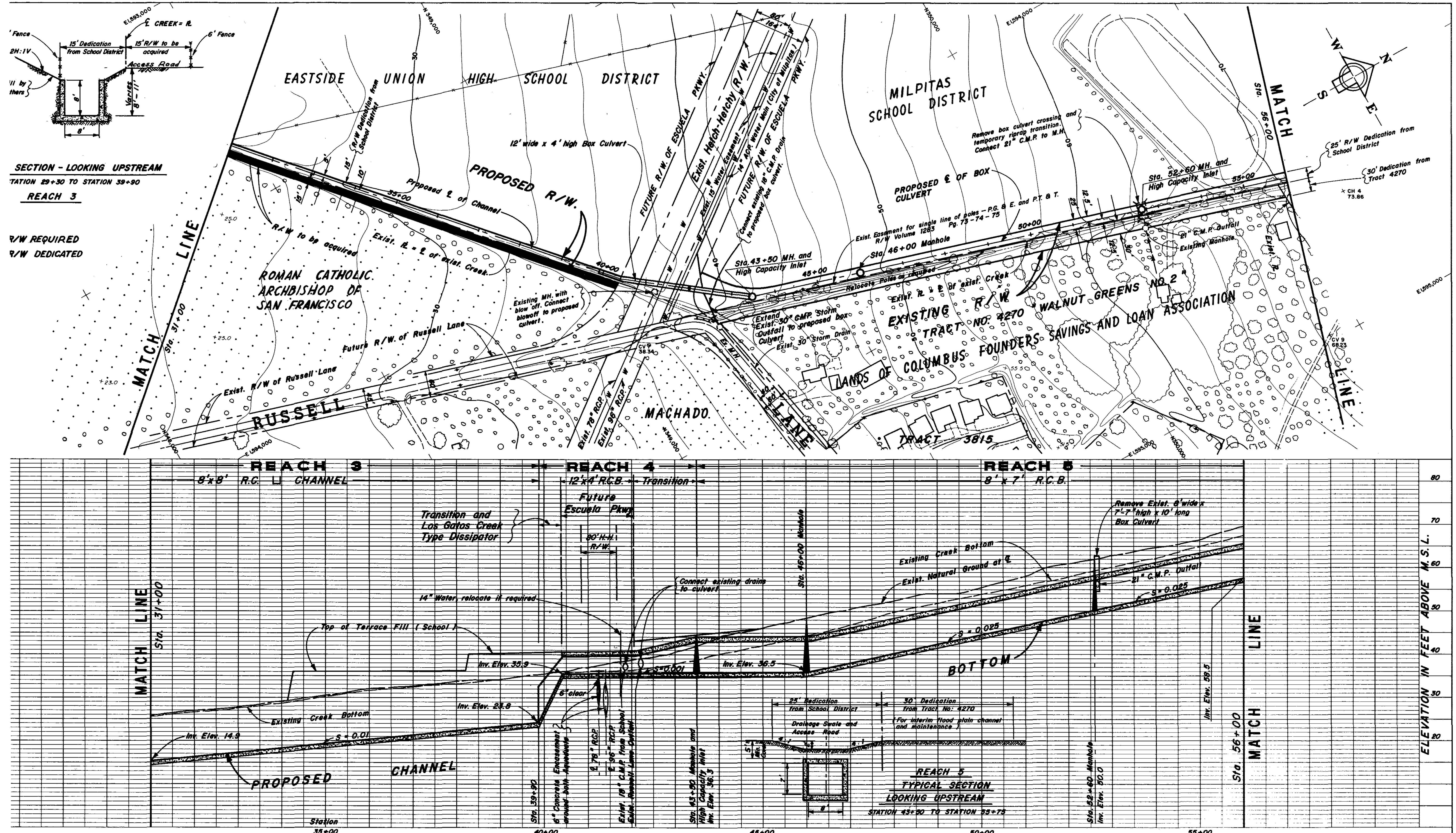
ACCEPTED BY DISTRICT
Lloyd C Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40018

CALERA CREEK

PLATE 3


SECTION - LOOKING UPSTREAM
STATION 29+30 TO STATION 39+90
REACH 3
R/W REQUIRED
R/W DEDICATED
15' Dedication from School District
15' R/W to be acquired
℄ CREEK = R.
6' Fence
Access Road
2H:1V
EASTSIDE UNION HIGH SCHOOL DISTRICT
MILPITAS SCHOOL DISTRICT
ROMAN CATHOLIC ARCHBISHOP OF SAN FRANCISCO
PROPOSED R/W.
12' wide x 4' high Box Culvert
Proposed ℄ of Channel
R/W to be acquired
Exist. R = ℄ of exist. Creek
FUTURE R/W OF ESCUELA PKWY.
Exist. Hetch-Hetchy R/W.
Exist. 15' Water Easement
14" ACP Water Main (City of Milpitas)
Connect existing 18" C.M.P. Drain to proposed box culvert.
Existing MH. with blow off. Connect blowoff to proposed culvert.
Future R/W. of Russell Lane
Exist. R/W of Russell Lane
RUSSELL LANE
MACHADO
Exist. 78" R.C.P.
Exist. 96" R.C.P.
Sta. 43+50 MH. and High Capacity Inlet
Sta. 46+00 Manhole
Sta. 52+60 MH. and High Capacity Inlet
PROPOSED ℄ OF BOX CULVERT
Remove box culvert crossing and temporary riprap transition. Connect 21" C.M.P. to M.H.
Exist. Easement for single line of poles - P.G. & E. and P.T. & T. R/W Volume 1283 Pg. 73 - 74 - 75
Relocate Poles as required
Extend Exist. 30" CMP. Storm Outfall to proposed box culvert
Exist. 30" Storm Drain
EXISTING R/W
TRACT NO. 4270 WALNUT GREENS NO. 2
LANDS OF COLUMBUS FOUNDERS SAVINGS AND LOAN ASSOCIATION
TRACT 3815
21" C.M.P. Outfall
Existing Manhole
25' R/W Dedication from School District
30' Dedication from Tract 4270
MATCH LINE Sta. 31+00
MATCH LINE Sta. 56+00
REACH 3
8'x8' R.C. ⊔ CHANNEL
REACH 4
12'x4' R.C.B.
Transition
REACH 5
8' x 7' R.C.B.
Future Escuela Pkwy.
80' H.H. R/W.
Transition and Los Gatos Creek Type Dissipator
14" Water, relocate if required
Connect existing drains to culvert
Top of Terrace Fill (School)
Inv. Elev. 35.9
Inv. Elev. 23.8
Inv. Elev. 14.9
Inv. Elev. 36.5
Inv. Elev. 58.5
S = 0.01
S = 0.001
S = 0.025
6' clear
Existing Creek Bottom
Exist. Natural Ground at ℄
Remove Exist. 6' wide x 7'-7" high x 10' long Box Culvert
PROPOSED CHANNEL BOTTOM
Sta. 39+90
6" Concrete Encasement around both Aqueducts
78" R.C.P.
96" R.C.P.
Exist. 18" C.M.P. from School
Exist. Russell Lane Outfall
Sta. 43+50 Manhole and High Capacity Inlet Inv. Elev. 36.3
Sta. 46+00 Manhole
Sta. 52+60 Manhole Inv. Elev. 50.0
25' Dedication from School District
30' Dedication from Tract No. 4270 (For interim flood plain channel and maintenance)
Drainage Swale and Access Road
REACH 5 TYPICAL SECTION LOOKING UPSTREAM
STATION 43+50 TO STATION 55+75
Station
35+00
40+00
45+00
50+00
55+00
ELEVATION IN FEET ABOVE M.S.L.
20
30
40
50
60
70
80

REFER TO TRACING FOR LATEST REVISION		
DESCRIPTION	SUB	APPR

REFERENCE INFORMATION AND NOTES

1. DATE OF PHOTOGRAPHY - APRIL 20, 1967 ; MISSION 6712

SCALE

100 0 100 200 300

CONTOUR INTERVAL: 2 FEET

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DMJM

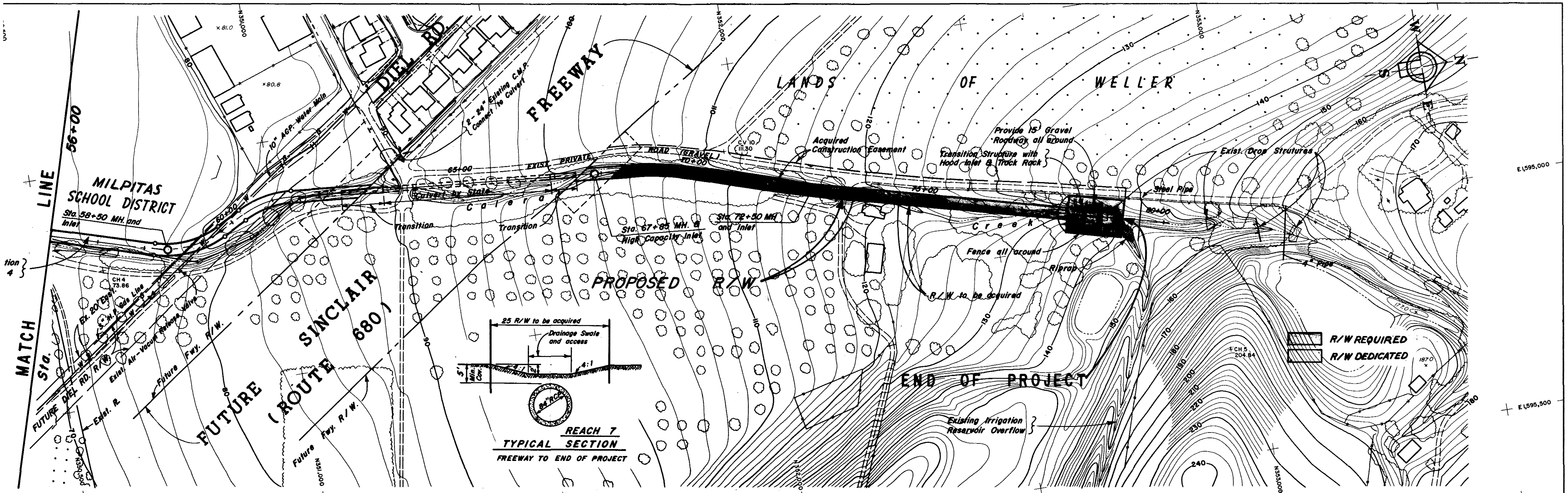
DATE NOV. 8, 1968	**santa clara county** FLOOD CONTROL and WATER DISTRICT
DESIGN E. J. H.	DESIGNED AND DRAWN BY: E. J. Hahaman
DRAWN W. K.	ENGINEERING APPROVAL Frank H. Barrett PROJECT ENGINEER
CHECKED F. H. B.	ACCEPTED BY DISTRICT Lloyd C. Fowler DISTRICT ENGINEER R.C.E. NO. 10822

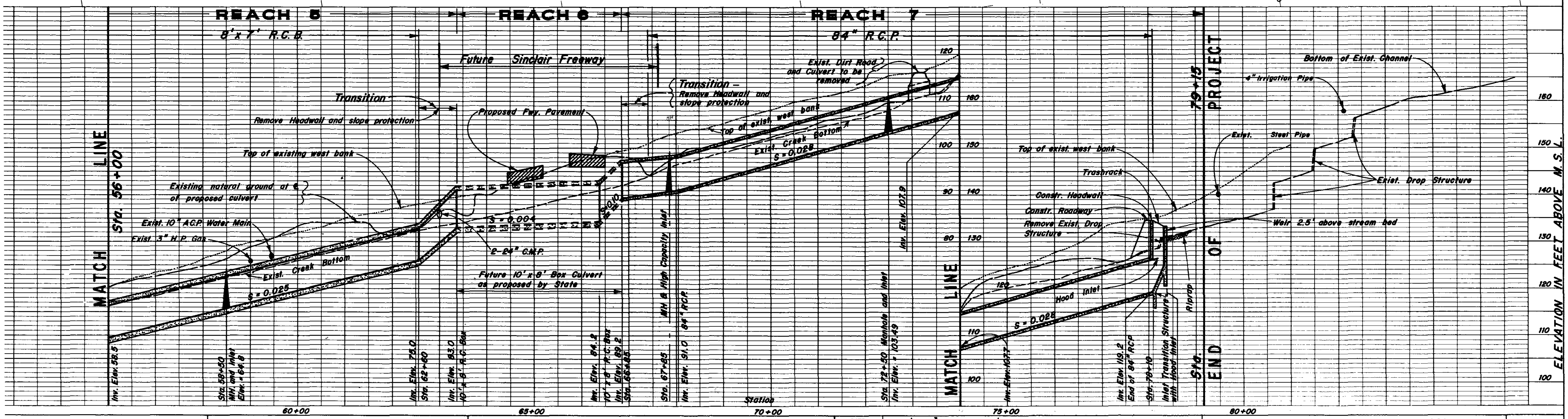
MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40018

CALERA CREEK

PLATE 4





REFER TO TRACING FOR LATEST REVISION		
DESCRIPTION	SUB	APPR

REFERENCE INFORMATION AND NOTES

1. DATE OF PHOTOGRAPHY - APRIL 20,1967 ; MISSION 6712

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100 0 100 200 300

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MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40018

CALERA CREEK

PLATE

5

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

REPORT

ON

PROPOSED CHANNEL IMPROVEMENTS

ON

QUIMBY CREEK

ZONE E-1

PROJECT NUMBER 40043

This report was prepared by
Bradberry Associates, Engineers-Consultants
Los Altos, California

in cooperation with the District Planning Division Staff
W. M. Roman - Deputy Director of Engineering
J. L. Richardson - Senior Hydraulic Engineer
W. Carlsen - Associate Hydraulic Engineer

June 1969

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Introduction 1

Description of Watershed 3

Design Criteria 5

Description of Proposed Project 7

Construction Staging 9

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Conclusions and Recommendations 12

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2 Estimated Costs of Project 10

PLATES

Plate

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2 Watershed Map

3 Plans and Profile (Station 0+00 to Station 28+25)

4 Plans and Profile (Station 28+25 to Station 55+70)

5 Plans and Profile (Station 55+70 to Station 84+00)

6 Plans and Profile (Station 84+00 to End of Project)

INTRODUCTION

Quimby Creek originates in the hills east of San Jose in the general vicinity of Quimby Road at about elevation 2300 feet. When the planned improvements are completed, Quimby Creek will be a tributary of Thompson Creek. The watershed boundary on the south is Aborn Road and the watershed of Fowler Creek; on the north, the watershed of Norwood Creek; and on the east, the westerly ridge of Hills Valley. At present (1968) about 10 percent of the watershed is in the City of San Jose, and the remainder is in unincorporated territory.

From the headwaters to about elevation 500 near Chaboya Road, the north branch of the creek is in a deep, well-defined arroyo with little chance of flooding. As the stream emerges from the arroyo, the grade flattens and the stream spreads out in a broad shallow swale, causing flooding along its course. The south branch of Quimby Creek ends abruptly at an excavated gravel pit on mushroom farm property.

Under existing conditions, Quimby Creek runoff contributes to flooding at several locations downstream from its emergence from the eastern foothills. The areas subject to flooding include subdivisions along White Road and Aborn Road and several farm houses located in the swale which serves as a streambed. Flooding problems will increase as urbanization spreads through the farming area. In order to minimize the flooding hazard, the channel of Quimby Creek must be improved to provide an effective outfall for runoff from the hills and adjacent property.

Many alternative channel improvements have been investigated to develop the most economical solution to the problem. This report presents the results of these studies and consists of:

1. A general description of the watershed and the flood problems together with a map showing the location of the proposed channel improvements.

2. An outline of the design criteria and a discussion of the proposed project with plates showing plans, profiles, typical cross sections and rights-of-way.

3. An estimate of the cost of the proposed improvements, and a suggested means of financing these costs.

DESCRIPTION OF WATERSHED

The Quimby Creek watershed has an area of about 2.17 square miles, with the major part of tillable land presently in orchards and farm produce. However, there is a definite trend toward urbanization, and residential development of medium density is spreading over the Quimby Creek watershed, mainly on the valley floor at present. Because of relatively mild slopes in the hills of the watershed, it is conceivable that a large portion of the entire watershed will eventually be subdivided. Schools, neighborhood parks and local shopping centers that accompany suburban development are already planned.

Plate 2 is a map of the Quimby Creek watershed. Presently Quimby Creek runs westerly in a northerly and southerly branch. The northerly branch follows a well-defined channel to about 2500 feet west of the intersection of Chaboya Road and the service road to the mushroom farm while the defined channel of the southerly branch terminates at the top of a gravel pit east of the mushroom farm. At the end of the defined channels flood waters spread across the valley floor and find their way to Thompson Creek without following a well-defined channel at present.

At times of serious flooding Quimby Creek waters pass the drainage divide into the Norwood Creek and Fowler Creek watersheds, aggravating flooding problems in those areas.

The soil on the steeper portion of the watershed consists predominately of sandy clay and gravelly clay types, while in flatter areas of the lower part of the water shed the soil is predominately of a brown sandy clay to yellowish-brown sandy clay type. The soils have a low to moderately low permeability and therefore the rate of runoff is medium to high.

Native growth in the hills is mainly low-growing brush and grasses, with some fruit orchards, scattered clumps of oak, and poplar trees in the upper arroyo. This type of vegetation is effective in reducing runoff for low rainfall intensities but it has little effect on runoff from the higher intensities which produce the design floods.

In computing flood flows for the design of creek improvements, these factors and existing and potential urban development of the entire watershed were considered.

DESIGN CRITERIA

Criteria used in the design of Quimby Creek flood control improvements followed accepted engineering standards. Hydraulic design of the channel considered the upper 80 percent confidence limit discharge in setting freeboard requirements. Conservative values of roughness (representing friction along channel banks and bottom) were used in the hydraulic design to allow for some deterioration in channel smoothness with time.

Economic evaluation of alternative channel designs was based on estimates of construction costs, engineering and inspection costs, right-of-way values, and the present worth of future maintenance costs.

The level of protection to be provided by completed improvements is in accord with the District standard. The project is designed to safely convey a one percent flood (a flood with a one percent chance of occurrence) to a point of disposal. Design flood flows meeting this standard for Quimby Creek were computed by means of a regional flood frequency analysis. This multiple correlation analysis was based on data from gaged watersheds, and flows were determined for Quimby Creek according to tributary area, mean annual precipitation and basin shape. The design flood flows at selected locations on Quimby Creek are given in Table 1.

When the lower part of the watershed, westerly of the confluence of the two branches of Quimby Creek, becomes fully developed, inflow to the creek along this reach will be from local storm drains. Peak runoff from local storm drains will precede the occurrence of peak runoff from the upper watershed.

Table 1

DESIGN FLOOD FLOWS

Reach	Station	Location	Watershed Area Acres	Peak Flow* Design** cfs	Peak Flow* Upper Limit*** cfs
-	upstream of 97+00	all of south branch above debris dam	398	225	400
IV	0 to 7+00 and upstream of 7+00	all of north branch above debris basin	271	155	280
Part of III	57+00 to 97+00	contour elev. 280 to debris dam	819	340	600
I, II, and Part of III	0+00 to 57+00	Thompson Creek to contour elev. 280	1390	550	800

* at lower location on reach.

** for 100-year recurrence interval.

*** at 80% confidence level for 100-year recurrence interval. (used in establishing freeboard requirements).

DESCRIPTION OF PROPOSED PROJECT

Proposed improvements to Quimby Creek extend over a length of about 10,500 feet and include earth channelsections, concrete-lined sections, underground conduits, drop structures, intake structures, energy dissipators, farm bridges, and a debris basin.

The proposed improvements to Quimby Creek are illustrated on Plates 3 through 6, and begin with a concrete confluence structure at Thompson Creek near the intersection of Scottsdale Drive and Westgrove Lane. This structure is to be constructed as part of the Thompson Creek improvements. Upstream from the Thompson Creek confluence to Sta. 40+00, a trapezoidal earth channel is planned. Excessive ground slope will be reduced by drop structures to maintain flow velocities and tractive force below erosive levels. (See Plate 3.) Under White Road a 10-foot by 6-foot reinforced concrete box culvert is utilized to convey the design flood, and the culvert has inlet and outlet transitions which return to the trapezoidal earth channel. The earth channel center line is located at the property line between adjacent ownerships. No farm crossings appear necessary in this reach. A 5-foot wide area on each side of the trapezoidal channel has been shown for landscaping if desired by the City or County.

Upstream of Sta. 41+00 the existing ground slope becomes so steep that continuous concrete lining or concrete underground conduit is required to prevent erosion. Based on a cost evaluation, the most economical solution is the installation of underground conduit from Sta. 40+60 to 97+00 in the main branch, and a concrete-lined section for the northerly branch. Pipe sizes are:

84-inch from Sta. 40+60 to 41+00
72-inch from Sta. 41+00 to 48+00
60-inch from Sta. 48+00 to 97+00

The conduit will have manholes at 650-foot intervals. The type of pipe used will be determined at the time of construction design based on more detailed soil analyses and timely unit cost data.

At Sta. 97+00 a debris basin in the existing gravel pit is planned. The southerly branch will outfall directly into the basin, and the northerly branch will be diverted into it through 700 feet of concrete-lined channel.

CONSTRUCTION STAGING

The project should be constructed as soon as possible to eliminate the flood hazard to residential areas and to provide an outfall facility for existing and proposed storm drains. Without the outfall, floodwaters are released on downstream residences and farm lands causing considerable damage.

To prevent concentration of a large flood flow in an inadequate facility, staged construction of flood control improvements normally progresses upstream. This procedure allows the new facilities to convey all floods up to the capacity of existing channels.

As noted before, Quimby Creek outfalls into the Thompson-Silver Creek complex which is inadequate to convey the flood waters of all of its tributaries. It is mandatory that improvements to Thompson Creek and Silver Creek precede construction of significant works on Quimby Creek.

In addition, the present channel in the lower reaches of Quimby Creek is almost non-existent; therefore, about 9500 feet of first stage facility will have to be constructed to make this an effective project. Since this minimum construction to effect flood relief constitutes about 90 percent of the project, construction staging is not recommended for Quimby Creek improvement.

PROJECT COSTS

Estimates of the construction costs for proposed channel improvements and right-of-way on Quimby Creek were based on prevailing (1968) prices. In addition to direct construction costs, a contingency item was estimated to account for the costs of engineering, advertising, legal fees, and other incidentals. The estimated costs are presented in Table 2.

Table 2

ESTIMATED COSTS OF PROJECT

Reach	Station	Construction Cost	Contingency Cost	Total Cost
I	0+00 to 40+00	$112,180	$ 28,045	$140,225
II, III	40+00 to 97+00	247,300	61,825	309,125
-	debris basin	57,800	14,450	72,250
IV	0+00 to 7+00 (north branch)	24,420	6,180	30,600
Total Right-of-Way				$227,800 (1)
			Total	$780,000

(1) Right-of-way cost for planter areas is not included.

FINANCING

Current assessed valuation of the East Zone will not provide an adequate source of funds to construct this project and other urgently needed projects in the near future. Since this project is recommended to be completed in one stage, the cost would require almost the entire zone income for one year. Therefore, to complete the project as soon as possible in one stage and still have funds available for other zone projects, a bond issue would appear to be the most feasible method of financing. If the bond issue approach is not adopted, then this project could be scheduled to be constructed from zone taxes at a later date.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the investigation reported herein, it is concluded that:

1. The existing outfall channels for Quimby Creek are inadequate to prevent flooding and damage to residential and farm areas.

2. Increasing development of the watershed will increase the flood hazard both by increasing runoff and by placing more homes in the path of flood waters.

3. The most economical solution is to install an open trapezoidal earth channel from the Thompson Creek confluence to Sta. 40+00. A concrete pipe is the most economical alternate from Sta. 40+60 upstream to the proposed debris basin at Sta. 97+00. A concrete-lined trapezoidal channel is required to direct the northerly branch into the debris basin.

4. The project does not lend itself to construction staging and the entire improvement should be completed as soon as possible.

5. The open channel part of the project shows a 5-foot area on each side set aside for landscaping. The cost for this right-of-way and for developing and maintaining these planting areas has not been included in the estimated project cost. Based on discussions with other agencies that have this type of development, the cost of maintenance would be $800 per mile per year or $14,000 for the life of the project. A District-wide study will be made in the future to determine the best type of aesthetic treatment and its corresponding cost for our facilities.

6. The estimated construction costs including contingency and rights-of-way are $780,000.

Based on these conclusions, it is recommended that the improvement of Quimby Creek as proposed herein be approved and construction initiated as soon as financing is arranged.

Submitted by
Bradberry Associates

James M. Lenhart
James M. Lenhart
Program Manager

Recommended Approval

William M. Roman
William Roman
Project Coordinator

Approved

Lloyd C Fowler
Lloyd C. Fowler
Director of Engineering

MAP AND GENERAL PLAN

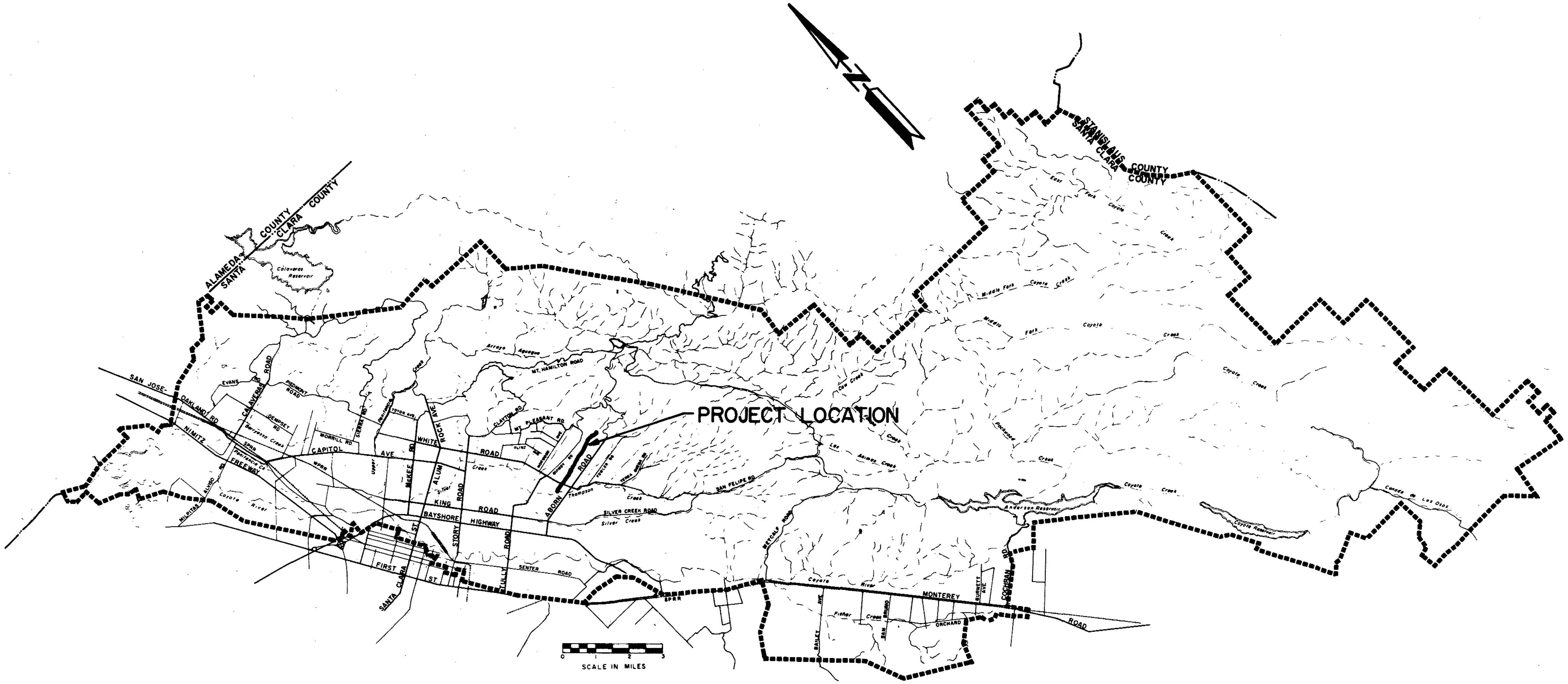
FOR

QUIMBY CREEK

FROM THOMPSON CREEK TO FOOTHILLS

PROJECT NO. 40043 IN ZONE E-1 'EAST'

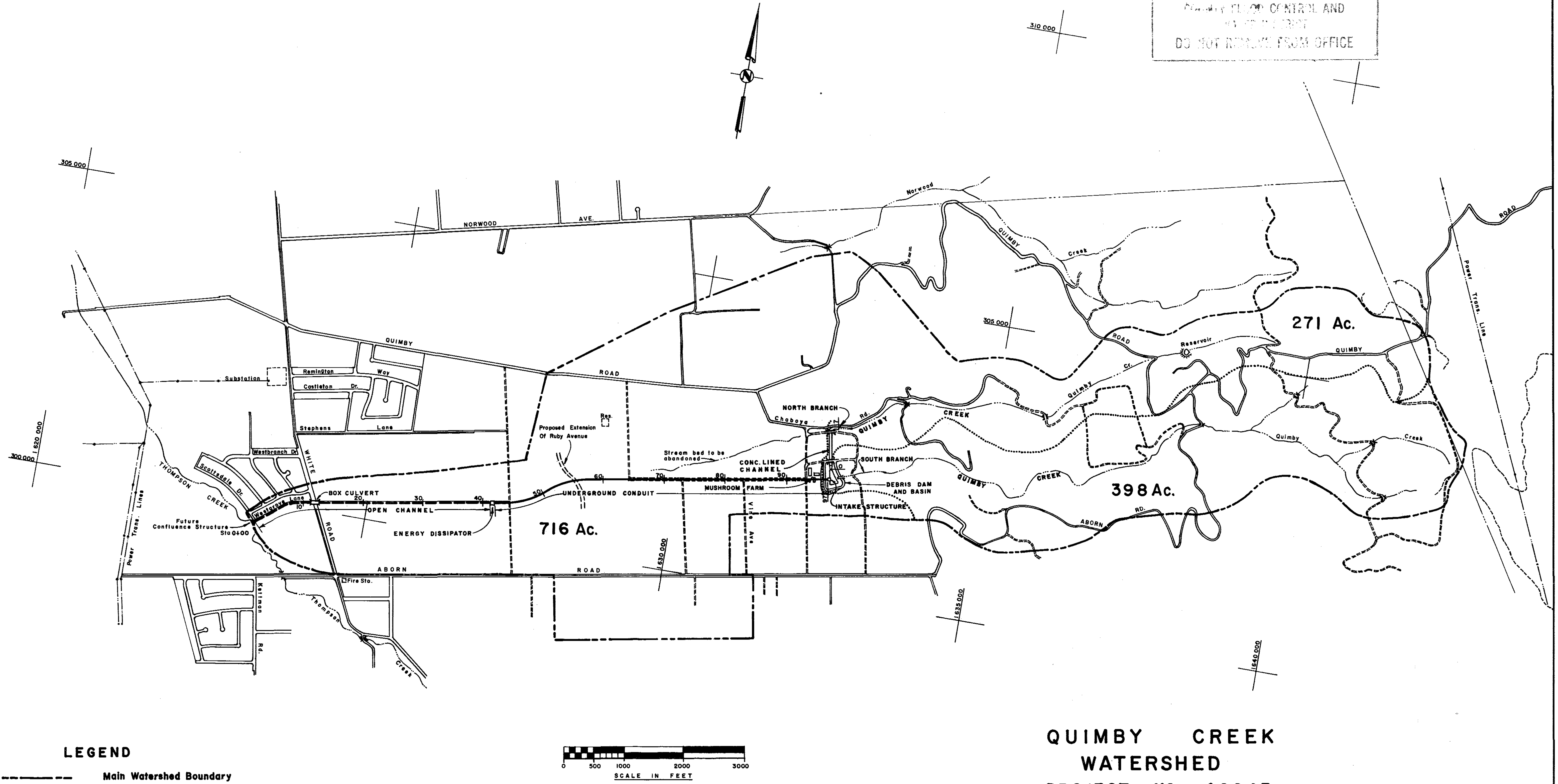
SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT
SANTA CLARA COUNTY, CALIFORNIA



Project Approval:
Donald K Currlin
General Manager
Date: 4/30/69

PLATE I

OFFICE COPY
COUNTY OF SANTA CLARA
COUNTY FLOOD CONTROL AND
WATER DISTRICT
DO NOT REMOVE FROM OFFICE

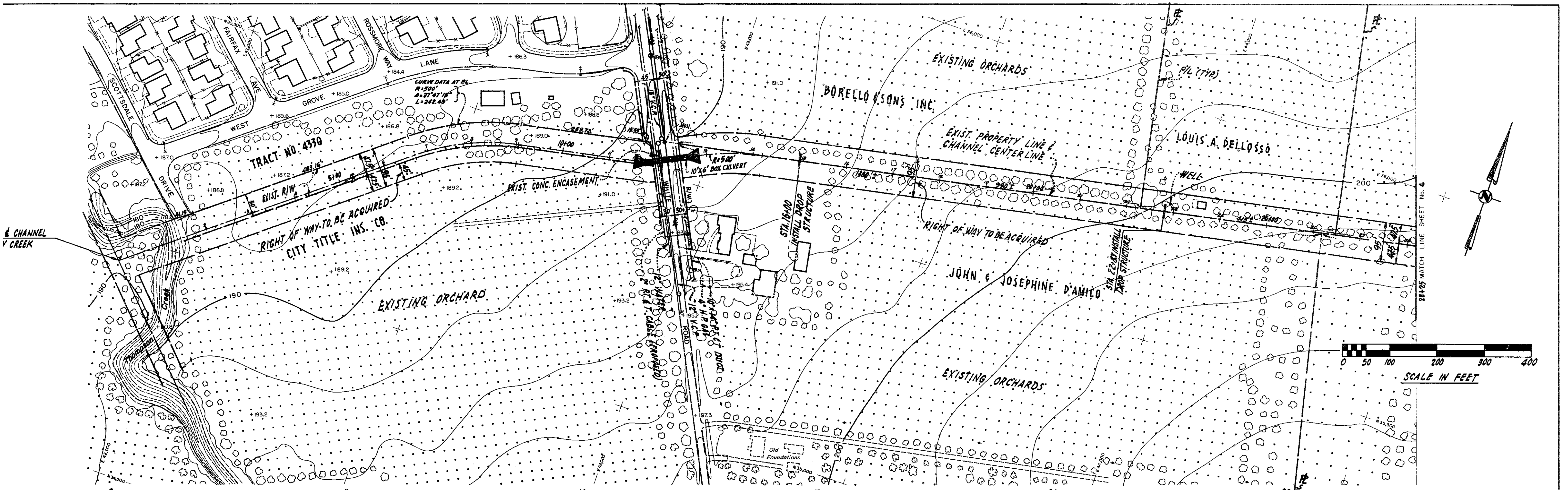


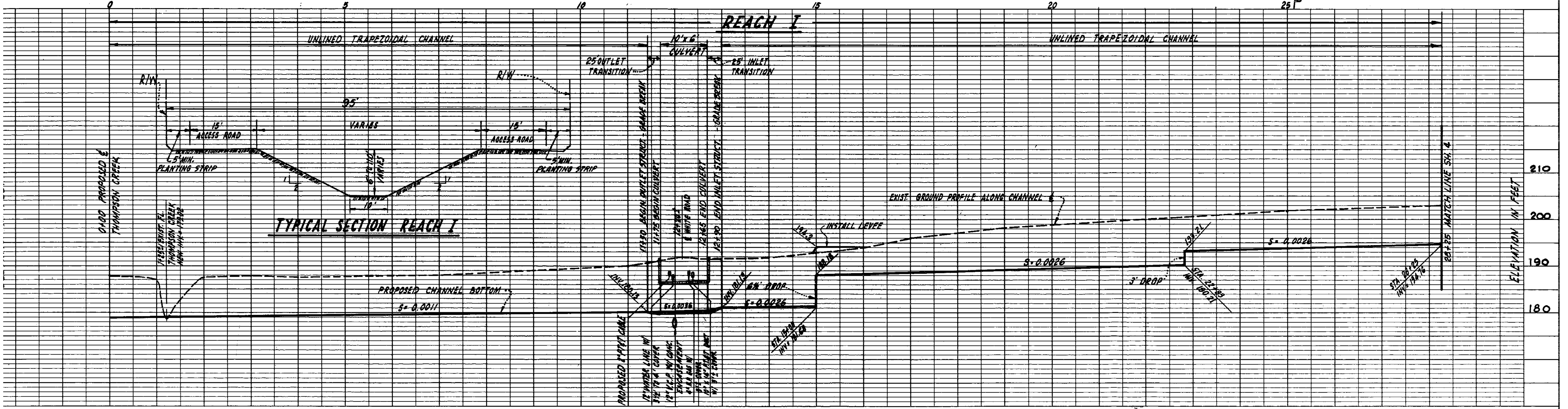
LEGEND

— — — — —	**Main Watershed Boundary**
··························	**Intermediate Watershed Boundary**

QUIMBY CREEK WATERSHED
PROJECT NO. 40043
ZONE E-1 EAST
TOTAL ACREAGE = 1385

PLATE 2





REFER TO TRACING FOR LATEST REVISION

DESCRIPTION	SUB	APPR

NOTES

DATE OF PHOTOGRAPHY: MAY 15, 1967 MISSION 6719

BASE MAP PREPARED BY : GEORGE S. NOLTE CONSULTING CIVIL ENGINEERS INC. PALO ALTO , CALIFORNIA

DATE NOV. 1968
DESIGN VAN DE POL
DRAWN PARELLO
CHECKED LENHART

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY: Bendix Bradberry Associates Consulting Engineers Los Altos, California

ENGINEERING APPROVAL
James M. Lenhart
PROJECT ENGINEER RCE No. 10963

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

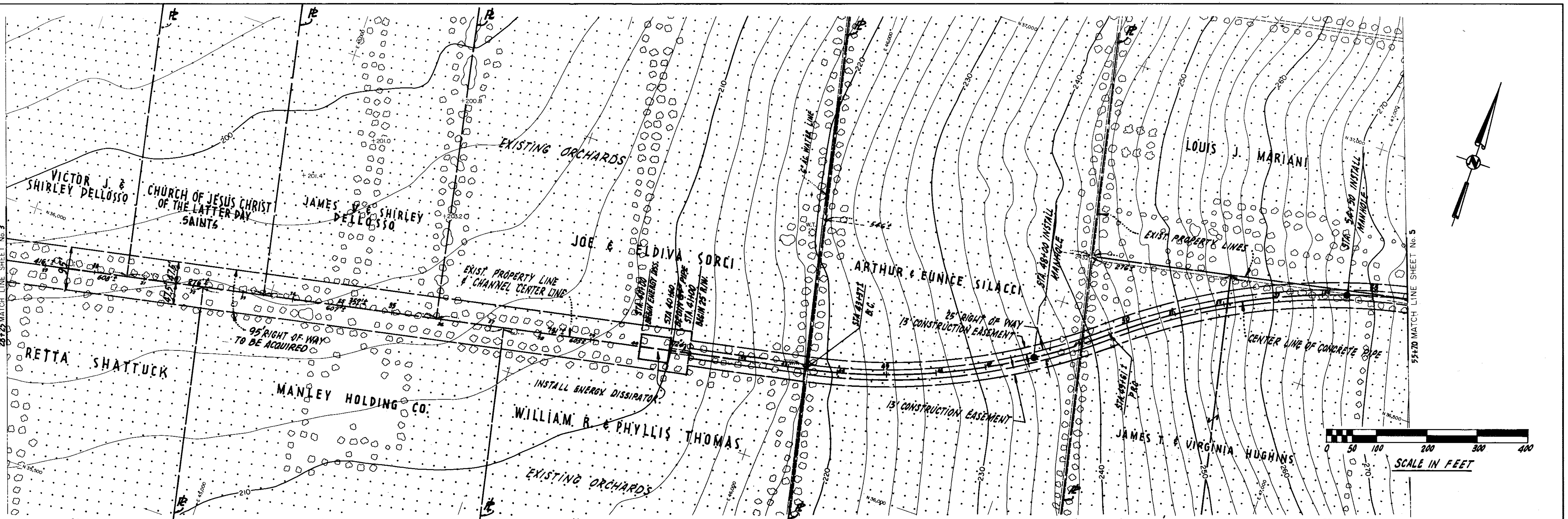
MAP AND GENERAL PLANS

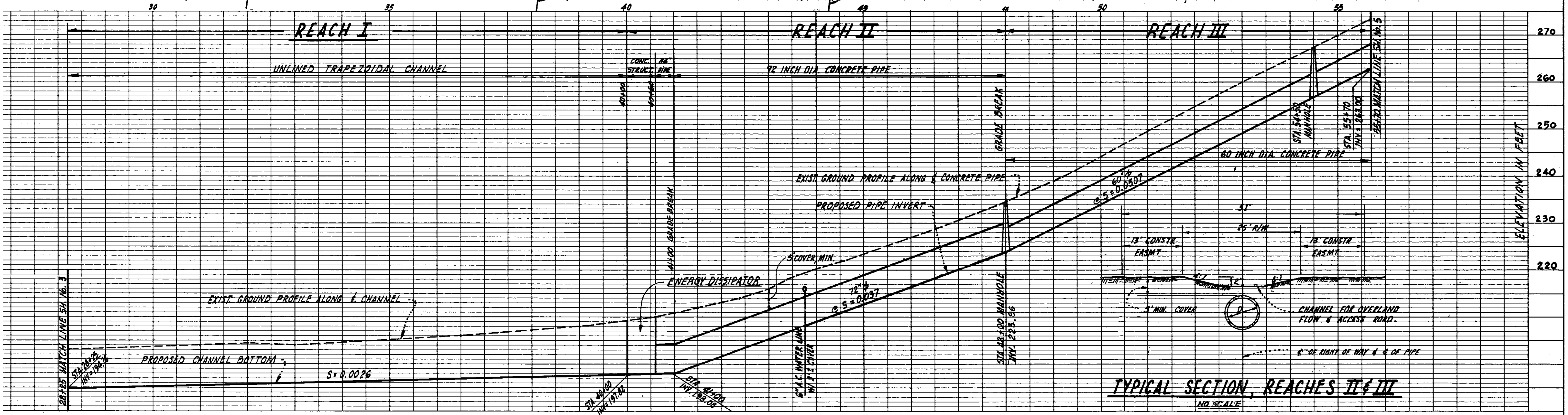
ZONE E-1 (EAST) PROJECT NO. 40043

QUIMBY CREEK

SCALE NOTED

PLATE 3


VICTOR J. & SHIRLEY DELLOSSO
CHURCH OF JESUS CHRIST OF THE LATTER DAY SAINTS
JAMES V. & SHIRLEY DELLOSSO
EXISTING ORCHARDS
JOE & ELDIVA SORCI
ARTHUR & EUNICE SILACCI
LOUIS J. MARIANI
RETTA SHATTUCK
MANLEY HOLDING CO.
WILLIAM R. & PHYLLIS THOMAS
JAMES T. & VIRGINIA HUGHINS
EXISTING ORCHARDS
28+25 MATCH LINE SHEET No. 3
55+70 MATCH LINE SHEET No. 5
EXIST. PROPERTY LINE & CHANNEL CENTER LINE
95' RIGHT OF WAY TO BE ACQUIRED
INSTALL ENERGY DISSIPATOR
STA. 40+00 BEGIN ENERGY DISS.
STA. 40+60 BEGIN 84" PIPE
STA. 41+00 BEGIN 25' R/W.
6" A.C. WATER LINE
W.T.
546'±
STA. 43+97± B.C.
25' RIGHT OF WAY
13' CONSTRUCTION EASEMENT
13' CONSTRUCTION EASEMENT
STA. 48+00 INSTALL MANHOLE
STA. 49+61± P.R.C.
EXIST. PROPERTY LINES
CENTER LINE OF CONCRETE PIPE
STA. 54+50 INSTALL MANHOLE
200
210
220
230
240
250
260
270
+201.0
+200.8
+201.4
+203.2
N36,000
N35,500
N36,500
N37,000
E45,000
E46,000
E47,000
416'±
608'±
276'±
607'±
352'±
605'±
2432
2763
47.5'
47.5'
95'
0 50 100 200 300 400
SCALE IN FEET



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NOTES

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DATE NOV. 1968
DESIGN VAN DE POL
DRAWN PARELLO
CHECKED LENHART

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY: Bendix Bradberry Associates Consulting Engineers Los Altos, California

ENGINEERING APPROVAL
James M. Lenhart
PROJECT ENGINEER R.C.E. No. 10963

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

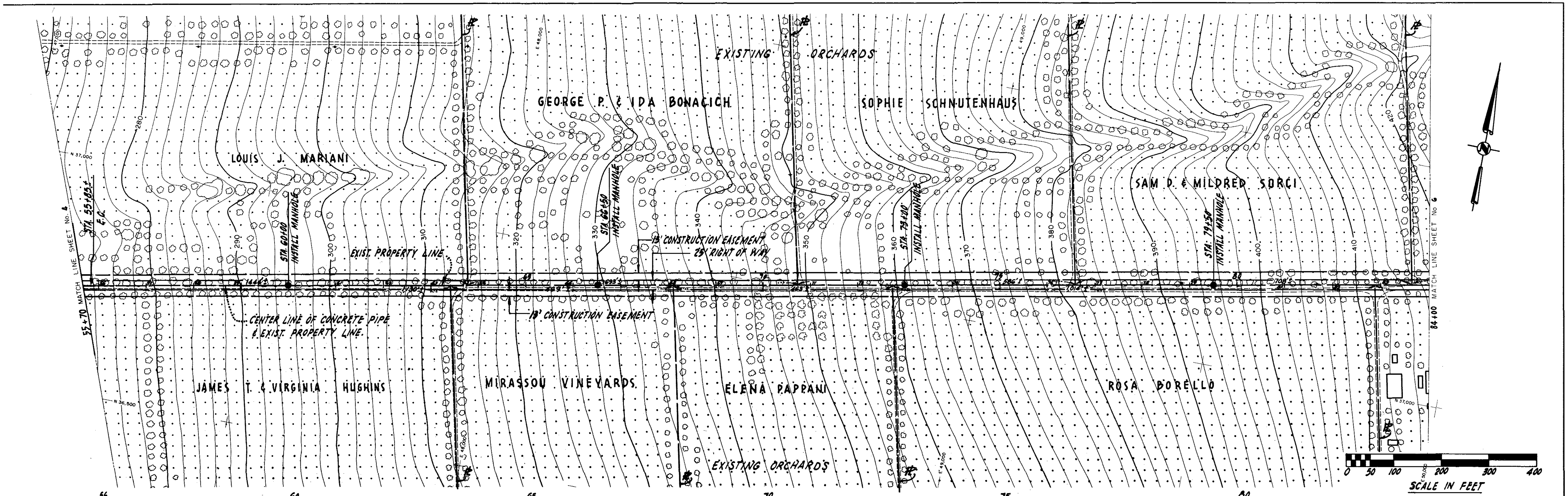
MAP AND GENERAL PLANS

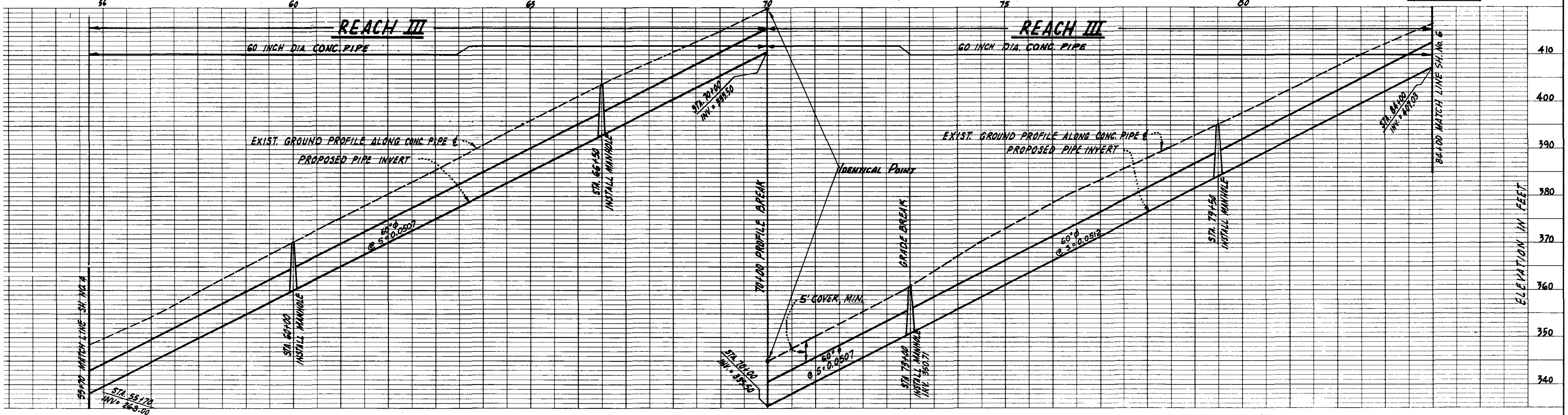
ZONE E-1 (EAST) PROJECT NO. 40043

QUIMBY CREEK

SCALE NOTED

PLATE 4





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DATE
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LENHART

santa clara county
FLOOD CONTROL and WATER DISTRICT

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ENGINEERING APPROVAL
James M. Lenhart
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ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

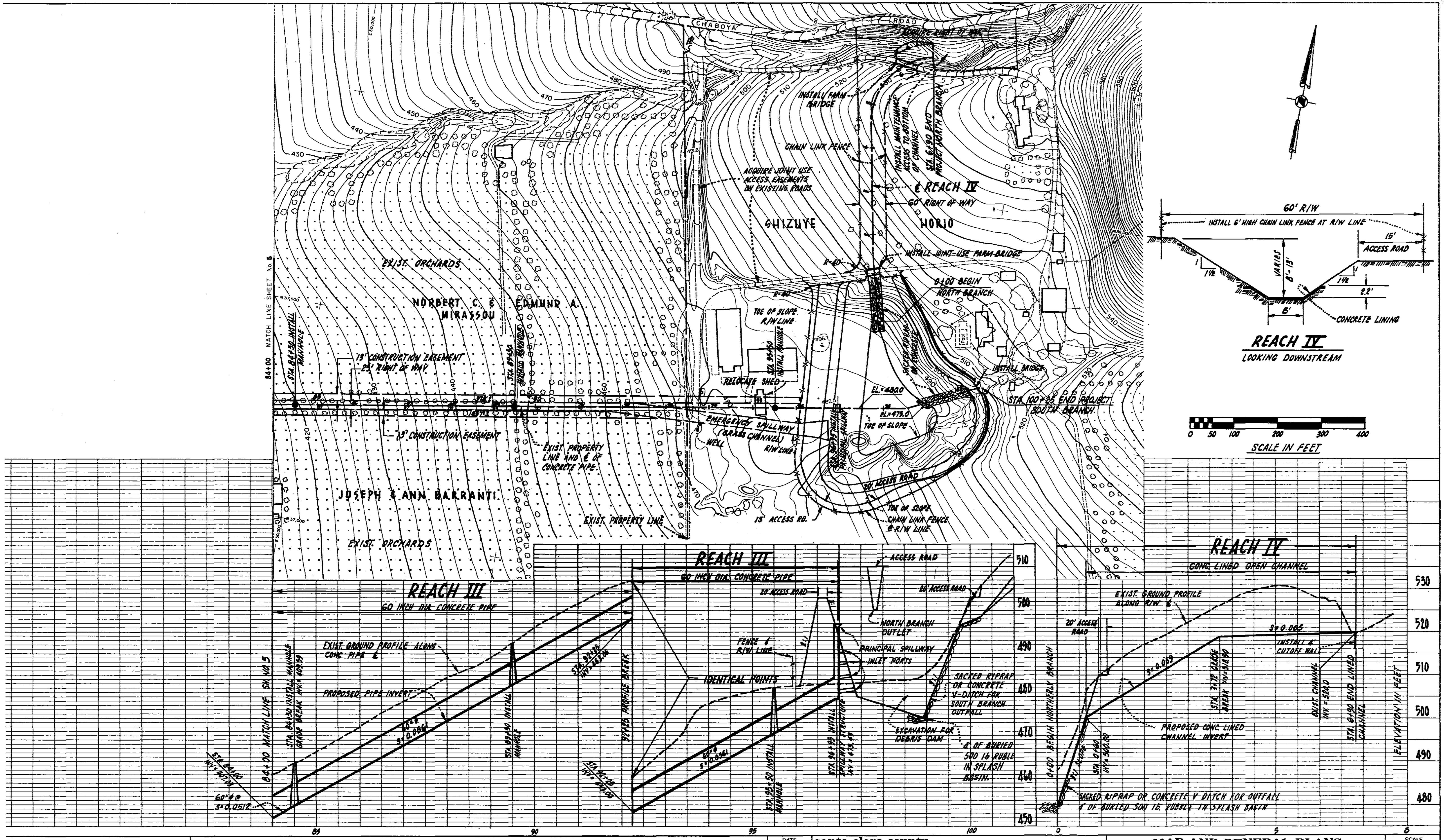
MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40043

QUIMBY CREEK

SCALE
NOTED

PLATE
5


CHABOYA
ROAD
ACQUIRE RIGHT OF WAY
INSTALL FARM BRIDGE
CHAIN LINK FENCE
INSTALL MAINTENANCE ACCESS TO BOTTOM OF CHANNEL
STA. 6+90 END PROJECT NORTH BRANCH
ACQUIRE JOINT USE ACCESS EASEMENTS ON EXISTING ROADS
℄ REACH IV
60' RIGHT OF WAY
SHIZUYE
HORIO
INSTALL JOINT-USE FARM BRIDGE
0+00 BEGIN NORTH BRANCH
EXIST. ORCHARDS
NORBERT C. & EDMUND A. MIRASSOU
TOE OF SLOPE R/W LINE
STA. 95+50 INSTALL MANHOLE
SACKED RIPRAP OR CONCRETE
INSTALL BRIDGE
STA. 100+25 END PROJECT SOUTH BRANCH
MATCH LINE SHEET No. 5
84+00
STA. 84+50 INSTALL MANHOLE
13' CONSTRUCTION EASEMENT
25' RIGHT OF WAY
STA. 89+50 INSTALL MANHOLE
RELOCATE SHED
EL= 480.0
EL= 475.0
TOE OF SLOPE
EMERGENCY SPILLWAY (GRASS CHANNEL)
R/W LINE
WELL
13' CONSTRUCTION EASEMENT
EXIST. PROPERTY LINE AND ℄ OF CONCRETE PIPE
20' ACCESS ROAD
JOSEPH & ANN BARRANTI
EXIST. PROPERTY LINE
15' ACCESS RD.
TOE OF SLOPE
CHAIN LINK FENCE @ R/W LINE
EXIST. ORCHARDS
60' R/W
INSTALL 6' HIGH CHAIN LINK FENCE AT R/W LINE
15'
ACCESS ROAD
VARIES 8'-13'
1½
2.2'
8'
CONCRETE LINING
REACH IV
LOOKING DOWNSTREAM
0 50 100 200 300 400
SCALE IN FEET
REACH III
60 INCH DIA. CONCRETE PIPE
EXIST. GROUND PROFILE ALONG CONC. PIPE ℄
PROPOSED PIPE INVERT
84+00 MATCH LINE SH. No. 5
STA. 84+00 INV.= 407.14
60"⌀ @ S=0.0512
STA. 84+50 INSTALL MANHOLE GRADE BREAK INV.= 409.59
60"⌀ S=0.0561
STA. 89+50 INSTALL MANHOLE
STA. 92+25 PROFILE BREAK
STA. 92+25 INV.= 461.06
STA. 95+50 INSTALL MANHOLE
IDENTICAL POINTS
FENCE & R/W LINE
20' ACCESS ROAD
STA. 96+95 INSTALL SPILLWAY STRUCTURE
PRINCIPAL SPILLWAY
INLET PORTS
ACCESS ROAD
NORTH BRANCH OUTLET
SACKED RIPRAP OR CONCRETE V-DITCH FOR SOUTH BRANCH OUTFALL
EXCAVATION FOR DEBRIS DAM
4' OF BURIED 500 lb. RUBBLE IN SPLASH BASIN.
REACH IV
CONC. LINED OPEN CHANNEL
EXIST. GROUND PROFILE ALONG R/W ℄
20' ACCESS ROAD
S=0.069
S=0.005
INSTALL 4' CUTOFF WALL
0+00 BEGIN NORTHERLY BRANCH
STA. 0+60 INV.= 500.00
STA. 3+72 GRADE BREAK
EXIST. CHANNEL INV.= 520.0
STA. 6+90 END LINED CHANNEL
PROPOSED CONC. LINED CHANNEL INVERT
SACKED RIPRAP OR CONCRETE V DITCH FOR OUTFALL
4' OF BURIED 500 lb. RUBBLE IN SPLASH BASIN
ELEVATION IN FEET
450
460
470
480
490
500
510
520
530
85
90
95
100
0
5
8

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santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY: Bendix Bradberry Associates Consulting Engineers Los Altos, California

ENGINEERING APPROVAL
James M. Lenhart
PROJECT ENGINEER RCE No. 10963

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40043

QUIMBY CREEK

SCALE
NOTED

PLATE
6

SANTA CLARA COUNTY FLOOD CONTROL
AND
WATER DISTRICT

REPORT
ON
PROPOSED CHANNEL IMPROVEMENTS
ON
FOWLER CREEK

ZONE E-1

PROJECT NUMBER 40044

This report was prepared by
Heath - Bini - Kenefick, Civil Engineers, a Joint Venture
San Jose, California

in cooperation with the District's Planning Branch Staff
W. M. Roman - Deputy Director of Engineering
J. L. Richardson - Senior Hydraulic Engineer
W. F. Carlsen - Associate Hydraulic Engineer

June 1969

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6 PLAN AND PROFILE (North Branch - Station 88+82 to Station 98+00)

7 PLAN AND PROFILE (South Branch - Station 0+00 to Station 30+10)

INTRODUCTION

Fowler Creek originates in the hills east of San Jose in the general vicinity of Aborn Road at about elevation 2300 feet. It flows westerly through the foothills and valley floor to a confluence with Thompson Creek and an eventual outfall in Coyote Creek. The 1780 acre watershed of Fowler Creek is situated between Quimby Creek watershed on the north and Evergreen Creek watershed on the south. At present a small portion of the lower watershed is in the City of San Jose and the remainder is unincorporated territory.

Fowler Creek channel is well defined as it traverses through the foothills on the east until it enters the valley floor. As the creek emerges from the foothills, the grade flattens and deposition of sediment causes the flow to spread resulting in channel obliteration. The channel disappears some 4000 feet east of Thompson Creek and flow either dissipates into orchard or vineyard land, or sheet flows overland to Thompson Creek.

Under existing conditions Fowler Creek will cause flooding in most of the area after its emergence from the eastern foothills. The areas subject to flooding are presently vineyards, orchards and farm houses. Some residential homes along San Felipe Road and the Evergreen School are subject to flooding at high flows. Flood damage will increase with urbanization.

In order to eliminate the potential flooding hazard and minimize erosion, the channel of Fowler Creek must be improved to provide an effective outfall. Many alternative channel improvements have been investigated to develop the most economical solution to the problem. This report presents the results of these studies and consists of:

1. A general description of the watershed and the flood problems together with a map of the proposed channel improvements.

2. A discussion of the proposed project with plates showing plans, profiles, typical cross sections and rights-of-way.

3. An estimate of the cost of the proposed project and suggested means for financing these costs.

DESCRIPTION OF WATERSHED

The Fowler Creek watershed has an area of about 2.78 square miles, with 70 percent of the area fairly steep foothills. The remaining 30 percent of the area is relatively flat valley land planted in vineyard or orchards. It is anticipated that most of this valley land will eventually be subdivided with related schools, parks, and local shopping centers also being developed.

Plate 2 is a map of the Fowler Creek watershed. The tributary headwaters in the foothills are divided with the north branch containing about 920 acres and the south branch containing about 460 acres. The south branch emerges from the foothills just south of where Fowler Road enters the hills. Historically this branch was diverted by means of a diversion dam and canal to a storage reservoir to the south. The north branch emerges from the foothills halfway between Fowler Road and Aborn Road. The existing channel from this point runs southwesterly through orchard and farm land to a point near Fowler Road and then turns northwesterly, and disappears. From this point to Thompson Creek, the alignment of any defined channel is indeterminable.

The soils on the steeper portion of the watershed in the hills consist primarily of low permeable clay and gravelly clay developed on bedrock, while in the gently sloping areas of the downstream westerly part of the watershed, soils of alluvial origin consist of low to moderate permeable clayey silt and sand with occasional gravel and lenses of silty clay. Due to the relatively low infiltration rate of these soils, the rate of runoff resulting from precipitation (about 18 inches annually) is high.

Native growth in the hills is mainly grass with some low growing brush and a few trees. This type of vegetation has some effect in reducing the runoff for low rainfall intensities but has little or no effect on the higher intensity rainfall which produces the design flows.

In computing the flood flows for the design of the creek improvements these characteristic factors of the watershed and the existing potential urban development of a portion of the watershed were considered.

DESIGN CRITERIA

The criteria used in the design of the Fowler Creek flood control improvements followed accepted engineering standards. The hydraulic design of the channel considered the upper 80 percent confidence limit discharge in setting freeboard requirements. Conservative values of roughness (representing the friction along the channel banks and bottom) were used in the hydraulic design to allow for some deterioration in channel smoothness with time. Economic evaluation of alternative channel designs were based on estimates of construction, including engineering and inspection costs, right-of-way values, and the present worth of future maintenance costs.

The level of protection to be provided by the completed improvements, in accord with the District standard, is a project that is designed to safely convey a one percent flood (the so-called 100-year recurrence frequency flood) to a point of disposal. The design flood flows meeting this standard for Fowler Creek were computed by means of a Regional Flood Frequency Hydrologic analysis. This multiple correlation analysis, based on data from gaged watersheds, was utilized to determine the peak flood flow in accordance with tributary area, Mean Annual Precipitation and basin shape. Table 1 presents a tabulation of these values for selected locations on Fowler Creek.

TABLE 1

PEAK FLOWS FOR DESIGN FLOOD-FOWLER CREEK

Reach No.	Station	Location	Watershed (1) Area in Acres	Peak Flow (2) in C.F.S.	
				Design	Upper Limit
5	So. Branch 30+10 to 0+00	All of South Branch	460	230	400
4	98+00 to 90+60	All of North Branch	920	460	800
1,2,3	90+60 to 0+00	From confluence of tributaries to Thompson Creek	1780	660	1150

(1) At lower location of reach.

(2) Design flow is for the 100 year recurrence frequency. Upper limit is the expected flood flow at the 80% confidence level for 100 year recurrence frequency.

DESCRIPTION OF PROPOSED PROJECT

The proposed improvements to Fowler Creek extend over a length of 12,800 feet and include earth channel sections, underground conduits, drop structures, farm bridges, box culvert, debris basins and intake structures. The proposed improvements to Fowler Creek are illustrated in plan and profile on Plates 3 through 7.

The confluence structure with Thompson Creek will be included in the Thompson Creek project. The proposed improvements begin at Thompson Creek with a 12-foot by 8-foot reinforced box culvert under San Felipe Road. The box culvert extends 400 feet easterly through the residential area fronting on San Felipe Road to the beginning of open orchard land.

Upstream from the reinforced box culvert, Fowler Creek would be contained in a trapezoidal earth channel centered on the common property line situated about half-way between Fowler Road and Aborn Road. By acquiring right-of-way along this common property line the severance damages will be held to a minimum. The earth channel will have energy dissipator drop structures periodically to maintain flow velocities below erosive level (See Place 3). The trapezoidal earth channel will be spanned by one-lane bridges at locations where farm crossings are needed. Inverted siphons under the channel will be provided for the existing irrigation systems that cross the channel right-of-way. The open channel reach of Fowler Creek project will be fenced. A 5-foot wide area on each side of the trapezoidal channel has been shown for landscaping if desired by the City or County.

Upstream of Station 27+60 the existing ground slope becomes so steep that continuous concrete lining would be required to prevent erosion. At this point it was determined that an underground pipe was the most economical conveyance facility. Reinforced concrete pipe would be installed in a 25 foot right of way centered on the existing common property line about 1000 feet from both Aborn Road and Fowler Road and lying close to the center of the watershed. An energy dissipator would be installed at the outfall end of the concrete pipe to reduce discharge velocities below channel erosive rates. The concrete pipe, with diameters of 72 inches and 66 inches, would be constructed along the common property line to the confluence of the north and south branches at Station 90+60. The pipeline right-of-way is located in such a way that it could either fall in a back lot line permanent easement or within a future street right-of-way. Until the area is subdivided and street location fixed, the pipeline right-of-way surface would be shaped to act as a shallow channel to convey overland flow to inlet structures. The permanent right-of-way will also serve as an access road to maintain the pipeline.

The North Branch of Fowler Creek improvements would consist of a 54 inch diameter reinforced concrete pipeline from the confluence of the branches (Station 90+60) to a debris basin at the point where the existing creek emerges from the foothills. The debris basin is proposed to impound the debris laden flow from the foothills and allow some of the suspended materials to be caught before entering the pipeline. The basin also creates the required head necessary for pipeline entrance flow conditions.

The South Branch improvements would consist of a reinforced concrete pipeline with diameter ranging from 60 inches to 42 inches. This pipeline begins at the confluence of the branches (Station 90+60) and runs to the debris basin south of Fowler Road where the existing creek emerges from the foothills. The debris basin to be constructed would be similar to that described for the North Branch. The route of the South Branch follows the base of the foothills and a proposed road location.

On both North and South branches the debris basin constitutes the upper limits of proposed improvements. From the debris basins upstream the creek branches are in a deep well defined arroyo with little chance of flooding. Additional debris basins or check structures may be installed, on a maintenance basis, in the upper reaches of Fowler Creek if it is found necessary to control erosion or unstable banks.

CONSTRUCTION STAGING

The project should be constructed as soon as possible to eliminate potential flooding and to provide an outfall facility for existing and proposed storm drains. Without a defined channel, flood damages of increasing magnitude can be expected.

It is often feasible to install improvements on a flood control facility in stages in order to reduce the capital outlay during any one fiscal year. However, Fowler Creek does not lend itself to staged construction because of the non-existence of an adequate channel that could be used to carry run-off on a temporary basis, until all construction could be completed. Therefore it is recommended that the project be constructed as a unit.

PROJECT COSTS

Estimates of the costs of construction of the proposed channel improvements and right of way on Fowler Creek were based on prevailing (1968) prices. A contingency item in the amount of 25% was added to allow for costs of engineering, advertising, legal fees, and other miscellaneous costs.

TABLE 2

ESTIMATED COSTS OF PROJECT

FOWLER CREEK

Reach No.	Station Limits	Construction Cost	Right-of-Way Cost	Total Cost
1	Reinforced Box Culvert 1+60 to 5+10	$ 49,000	$ 1,000	$ 50,000
2	Earth Channel 5+10 to 27+25	65,000	72,000 (1)	137,000
3	Reinforced Concrete Pipe 27+25 to 90+60	405,000	43,000	448,000
4	North Branch R.C.P. & Basin 90+60 to 98+00	56,000	9,000	65,000
5	South Branch R.C.P. & Basin 0+00 to 30+10	155,000	5,000	160,000
	Project Total	$730,000	$ 130,000	$860,000

No cost estimates were made for the potential erosion control facilities which may be necessary in the upper watershed of Fowler Creek. Construction of such facilities can be delayed until they are found to be necessary and can be financed on a maintenance basis.

(1) The right-of-way cost for the planter areas is not included.

Right-of-way costs estimates are based on land value at present (1968) and the assumption that no additional development will occur along the project route prior to construction. If any development should be proposed, the customary dedication of right-of-way will reduce costs accordingly.

FINANCING

The current source of revenue from zone taxes will not provide funds to construct this project in the near future. Since this project is recommended to be completed in one stage, the cost would require more than the entire zone income for one year. Therefore to complete the project in the near future it is recommended that this project be included with other needed projects in a bond issue as the most feasible method of financing.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the investigation reported herein, it is concluded that:

1. The Fowler Creek outfall channels have been obliterated or, where visible, are inadequate to handle design flow and to prevent flooding and damage to the area in the lower watershed.

2. Increasing development of the watershed will increase the flood potential.

3. Development of the area is being deterred by lack of sufficient flood control and storm drain facilities.

4. The most economical solution is to construct an open trapezoidal earth ditch from San Felipe Road to a point 3000 feet east and a reinforced concrete pipeline from there to the point where the north and south branches emerge from the foothills.

5. The project is not subject to construction staging so the entire project should be constructed at one time as soon as possible.

6. The open channel part of the project shows a 5-foot area on each side set aside for landscaping. The cost for this right-of-way and for developing and maintaining these planting areas has not been included in the estimated project cost. Based on discussions with other agencies that have this type of development, the cost of maintenance would be $800 per mile per year or $7,800 for the life of project. A District-wide study will be made in the future to determine the best type of aesthetic treatment and its corresponding cost for our facilities.

7. The estimated construction cost including a contingency item and rights-of-way is $860,000.

8. It is recommended that improvements of Fowler Creek as proposed

herein be approved and financing of the facilities be effected through a Bond Issue.

Submitted by:

HEATH-BINI-KENEFICK
Civil Engineers
A Joint Venture

By Harlan H Heath
Harlan H. Heath
Project Engineer

Recommended Approval:

William M. Roman
William M. Roman
Project Coordinator

Approved:

Lloyd C. Fowler
Lloyd C. Fowler
Director of Engineering

MAP AND GENERAL PLAN

FOR

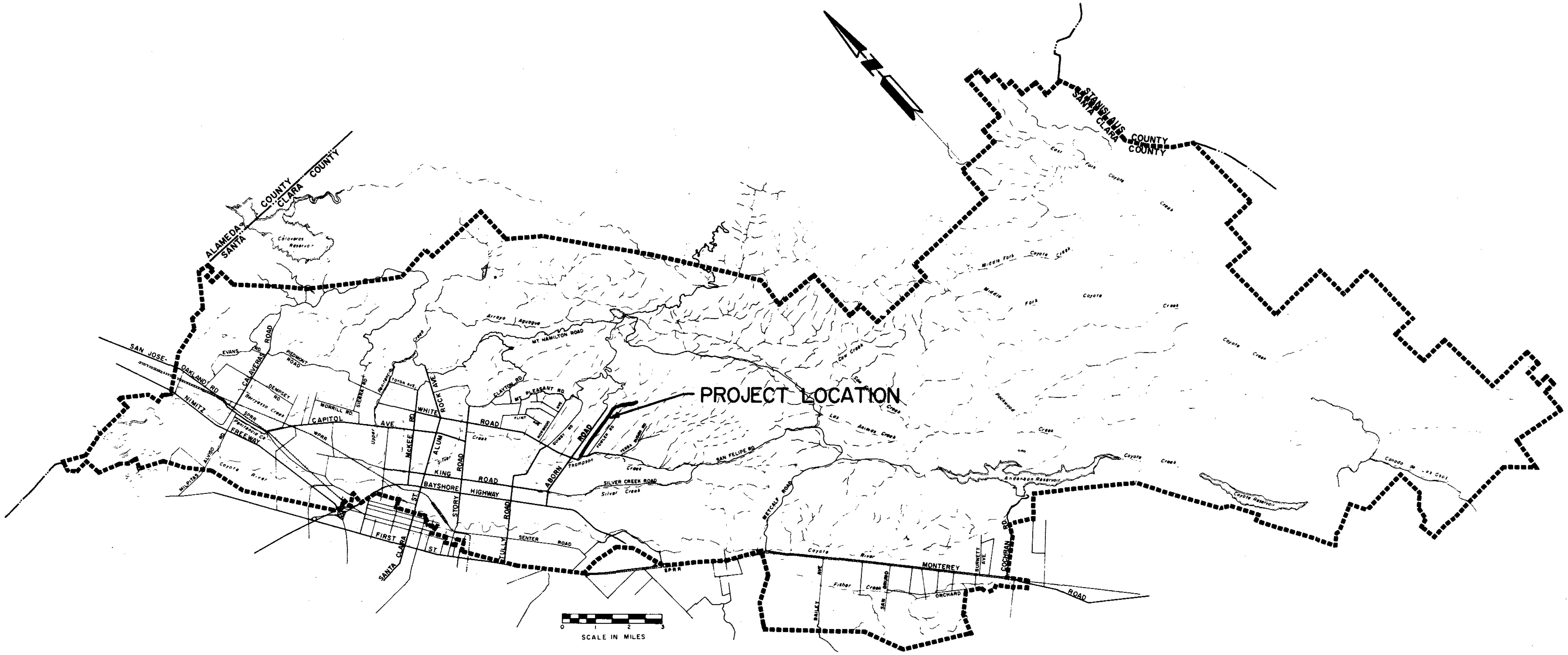
FOWLER CREEK

FROM THOMPSON CREEK TO FOOTHILLS

PROJECT NO. 40044 IN ZONE E-1 'EAST'

SANTA CLARA COUNTY FLOOD CONTROL AND WATER DISTRICT

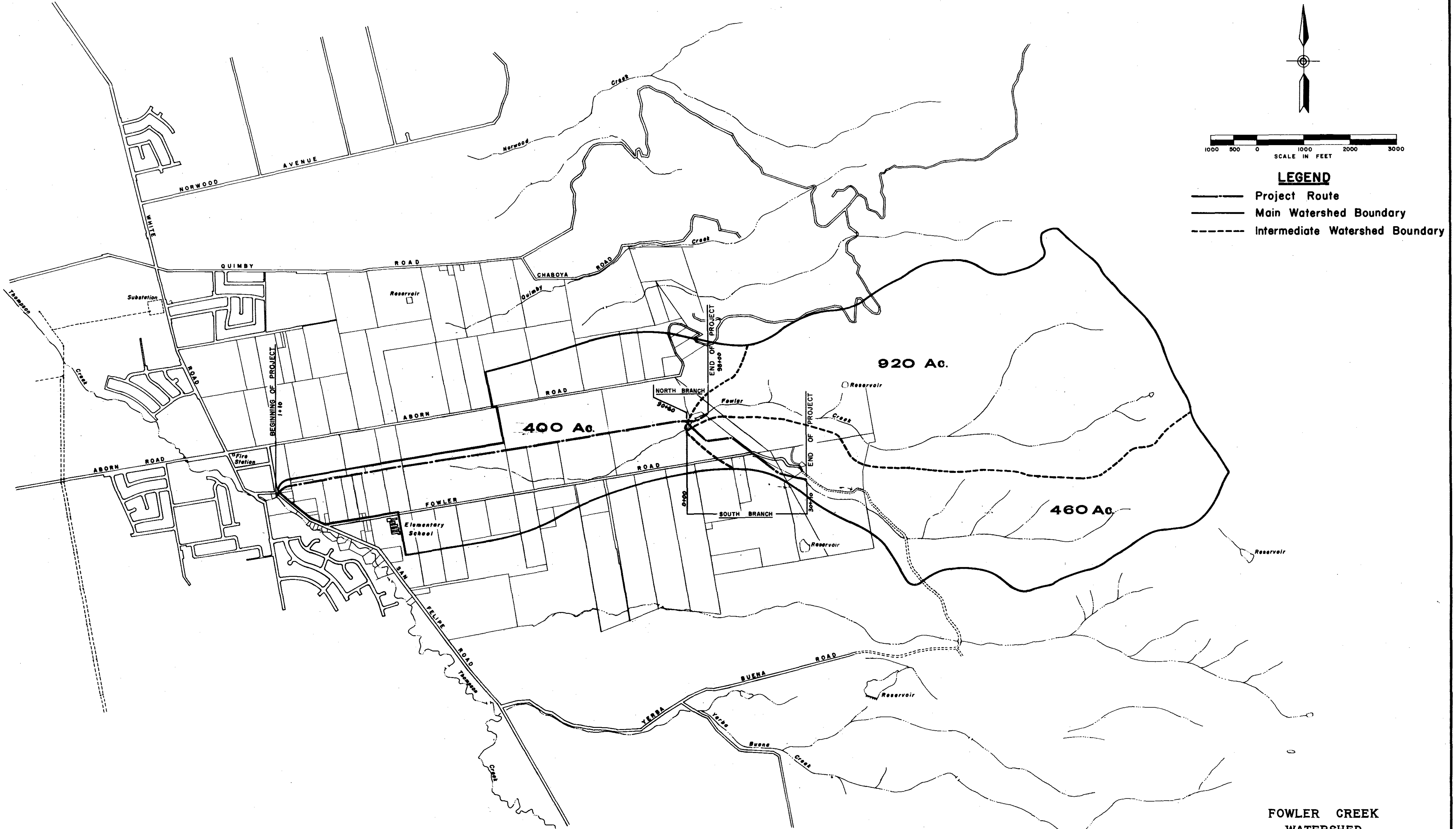
SANTA CLARA COUNTY, CALIFORNIA



Project Approval: Donald K Currlin
General Manager

Date: 4/30/69

PLATE I



FOWLER CREEK
WATERSHED
TOTAL ACREAGE = 1780 Ac.

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DESCRIPTION	SUB	APPR	
			DATE OF PHOTOGRAPHY

DATE NOV. 1968
DESIGN H.H.H.
DRAWN C.T.M.
CHECKED L.M.B.

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY:
HEATH • BINI • KENEFICK CIVIL ENGINEERS, A JOINT VENTURE
173 NORTH MORRISON STREET, SAN JOSE

ENGINEERING APPROVAL
Harlan H. Heath
PROJECT ENGINEER R.C.E. NO. 8708

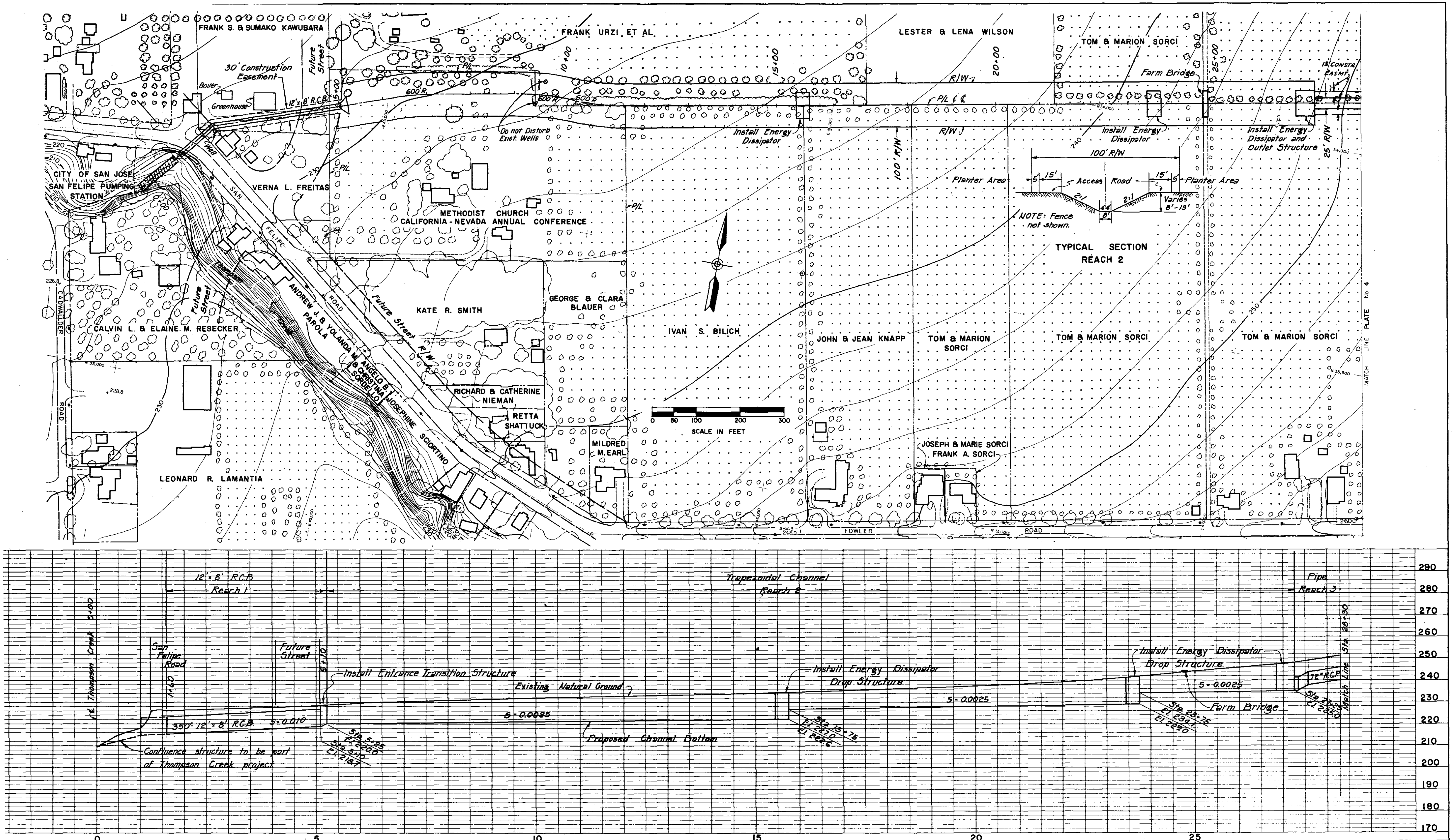
ACCEPTED BY DISTRICT
Lloyd C Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

MAP AND GENERAL PLANS

ZONE E-1 (EAST) **PROJECT NO. 40044**

FOWLER CREEK

SCALE 1" = 1000'
PLATE 2



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santa clara county
FLOOD CONTROL and WATER DISTRICT

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HEATH • BINI • KENEFICK 173 NORTH MORRISON STREET, SAN JOSE

ENGINEERING APPROVAL
Harlan H. Heath
PROJECT ENGINEER R.C.E. NO. 8706

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

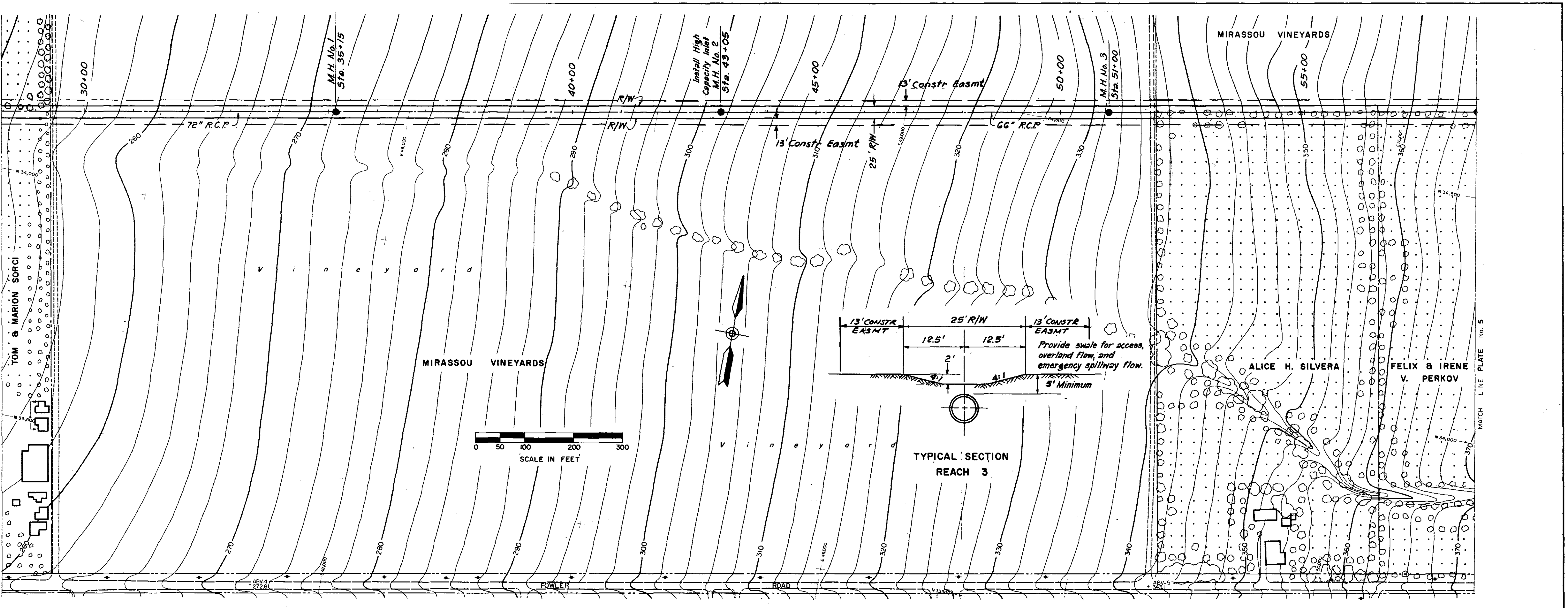
MAP AND GENERAL PLANS

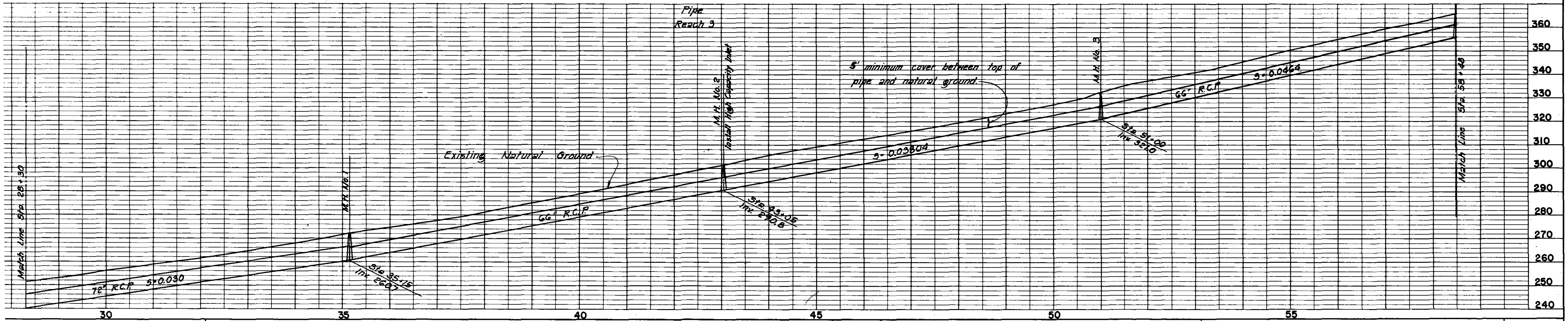
ZONE E-1 (EAST) PROJECT NO. 40044

FOWLER CREEK

SCALE
1" = 100'

PLATE
3





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FLOOD CONTROL and WATER DISTRICT

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HEATH • BINI • KENEFICK 173 NORTH MORRISON STREET, SAN JOSE

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Harlan S. Heath
PROJECT ENGINEER R.C.E. NO. 8708

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

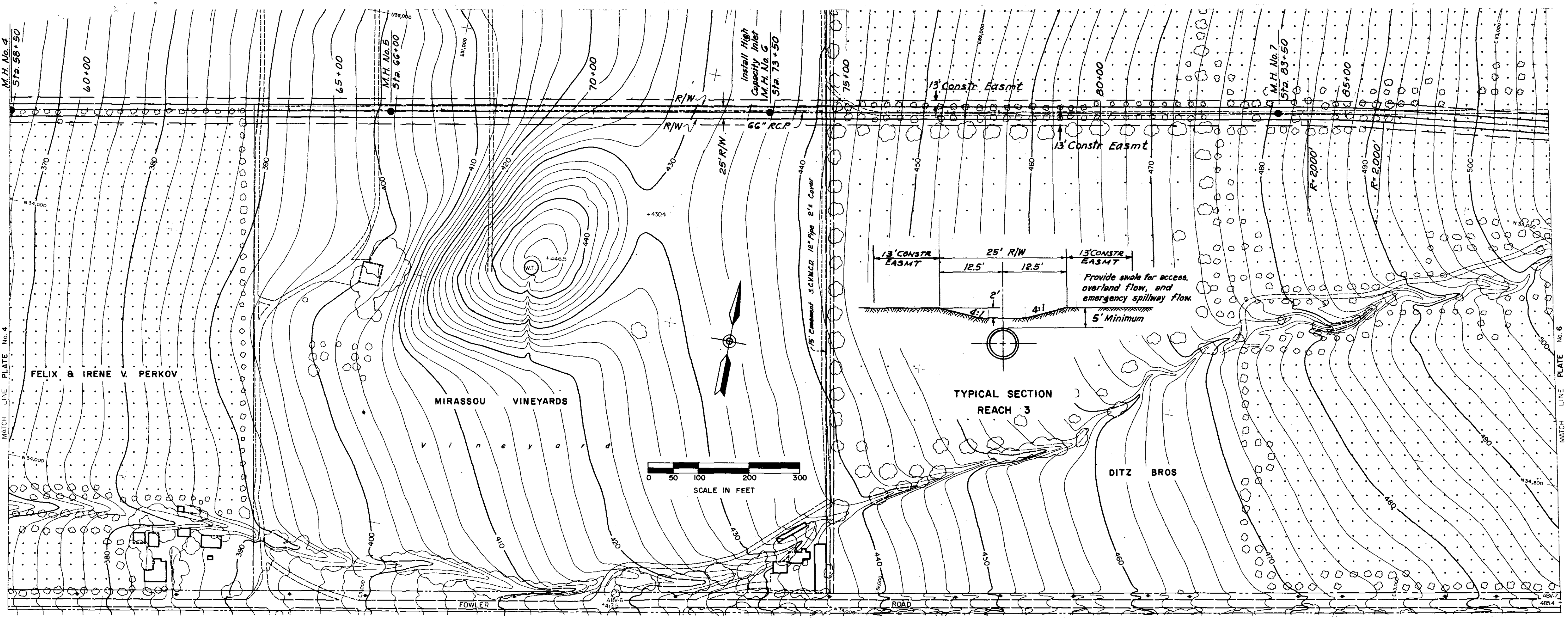
MAP AND GENERAL PLANS

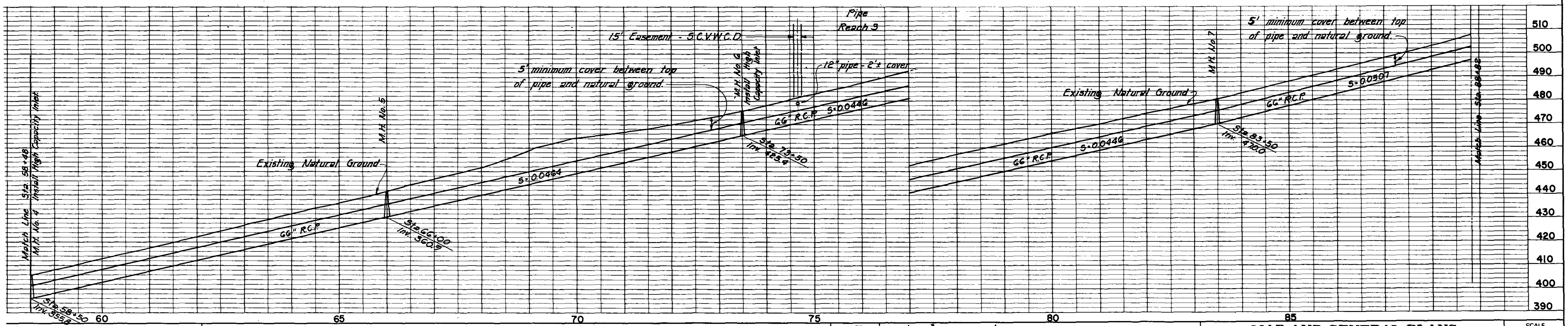
ZONE E-1 (EAST) PROJECT NO. 40044

FOWLER CREEK

SCALE
1" = 100'

PLATE
4





REFER TO TRACING FOR LATEST REVISION		
DESCRIPTION	SUB	APPR

NOTES

DATE OF PHOTOGRAPHY : MAY 15, 1967   MISSION : 6718   BASE MAP PREPARED BY : GEORGE S. NOLTE CONSULTING CIVIL ENGINEERS INC.   PALO ALTO, CALIFORNIA

DATE NOV. 1968	**santa clara county** FLOOD CONTROL and WATER DISTRICT
DESIGN H.H.H.	DESIGNED AND DRAWN BY: CIVIL ENGINEERS, A JOINT VENTURE **HEATH • BINI • KENEFICK** 173 NORTH MORRISON STREET, SAN JOSE
DRAWN C.T.M.	ENGINEERING APPROVAL Harland L. Heath PROJECT ENGINEER R.C.E. NO. 8709
CHECKED L.M.B.	ACCEPTED BY DISTRICT Lloyd C. Fowler DISTRICT ENGINEER R.C.E. NO. 10822

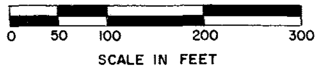
MAP AND GENERAL PLANS

ZONE E-1 (EAST)   PROJECT NO. 40044

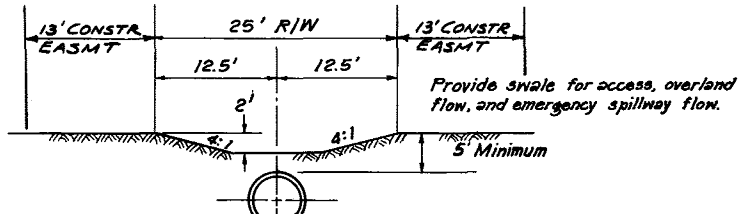
FOWLER CREEK

SCALE
1" = 100'

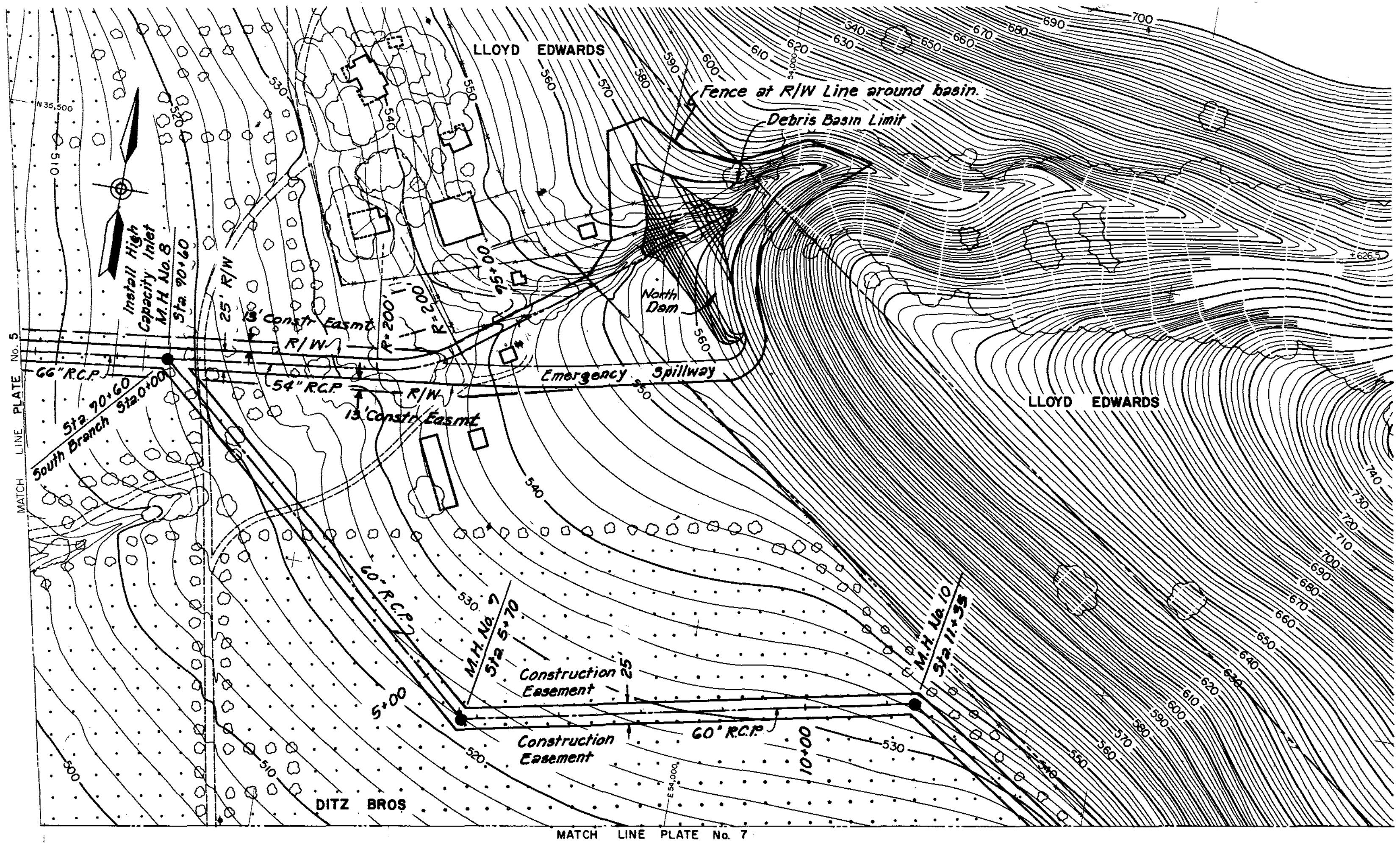
PLATE
5

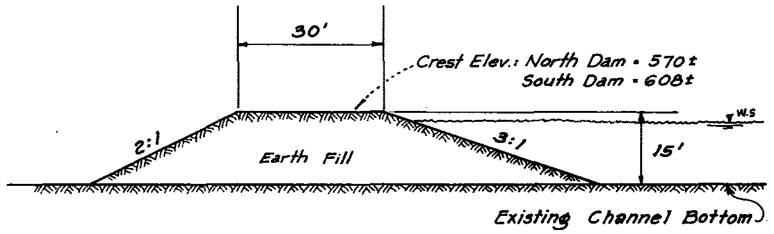


SCALE IN FEET

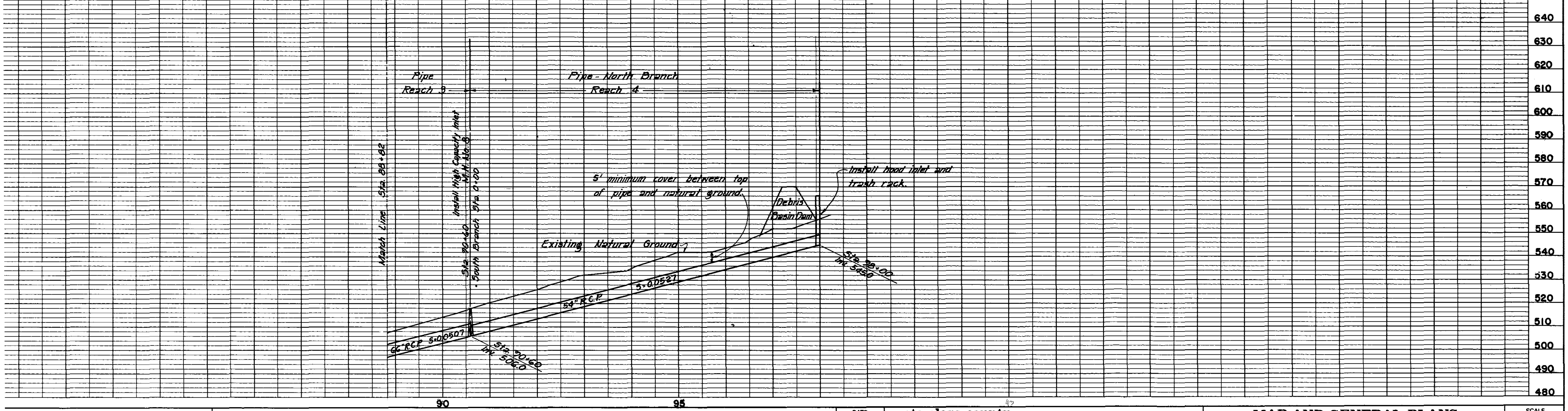

13' CONSTR EASMT
25' R/W
13' CONSTR EASMT
12.5'
12.5'
2'
4:1
4:1
5' Minimum
Provide swale for access, overland flow, and emergency spillway flow.

TYPICAL SECTION
REACH 3&4





TYPICAL SECTION
DEBRIS BASIN DAM
REACH 4 & 5



REFER TO TRACING FOR LATEST REVISION		
DESCRIPTION	SUB	APPR

NOTES

DATE OF PHOTOGRAPHY: MAY 15, 1967 MISSION: 6718 BASE MAP PREPARED BY: GEORGE S. NOLTE CONSULTING CIVIL ENGINEERS INC. PALO ALTO, CALIFORNIA

DATE NOV. 1968	**santa clara county** FLOOD CONTROL and WATER DISTRICT
DESIGN H.H.H.	DESIGNED AND DRAWN BY: CIVIL ENGINEERS, A JOINT VENTURE **HEATH • BINI • KENEFICK** 173 NORTH MORRISON STREET, SAN JOSE
DRAWN C.T.M.	ENGINEERING APPROVAL Harland S. Heath PROJECT ENGINEER R.C.E. NO. 8708
CHECKED L.M.B.	ACCEPTED BY DISTRICT Lloyd C. Fowler DISTRICT ENGINEER R.C.E. NO. 10822

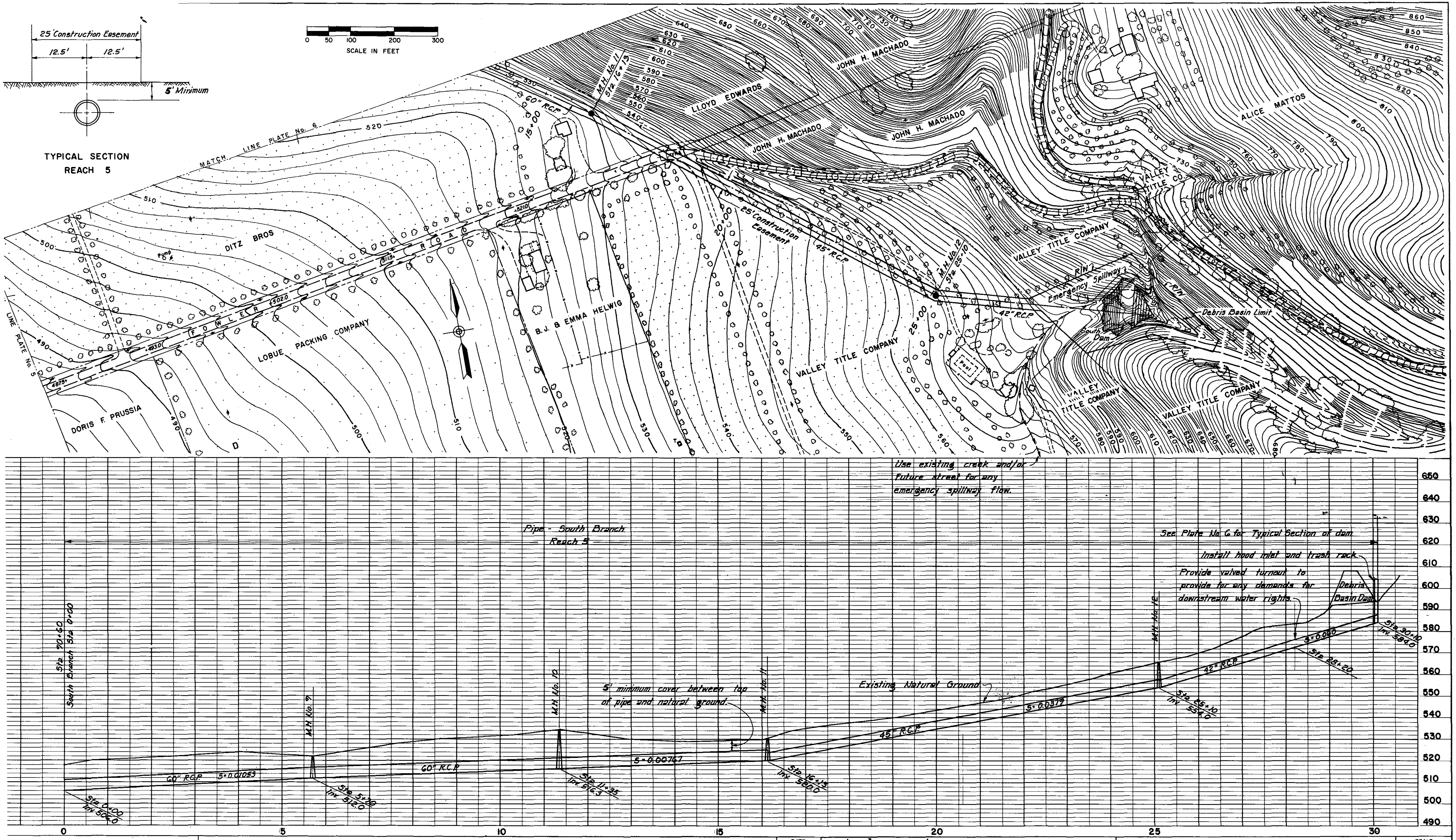
MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40044

FOWLER CREEK

SCALE
1" = 100'

PLATE
6



REFER TO TRACING FOR LATEST REVISION		
DESCRIPTION	SUB	APPR

NOTES

DATE OF PHOTOGRAPHY

DATE NOV. 1968
DESIGN H.H.H.
DRAWN C.T.M.
CHECKED L.M.B.

santa clara county
FLOOD CONTROL and WATER DISTRICT

DESIGNED AND DRAWN BY:
HEATH • BINI • KENEFICK CIVIL ENGINEERS, A JOINT VENTURE
173 NORTH MORRISON STREET, SAN JOSE

ENGINEERING APPROVAL
Harlan H. Heath
PROJECT ENGINEER R.C.E. NO. 8708

ACCEPTED BY DISTRICT
Lloyd C. Fowler
DISTRICT ENGINEER R.C.E. NO. 10822

MAP AND GENERAL PLANS

ZONE E-1 (EAST) PROJECT NO. 40044

FOWLER CREEK

SCALE 1" = 100'

PLATE 7